Universitat Autònoma de Barcelona

THE LOGIC OF PLATFORMIZATION AND NEWS

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THE LOGIC OF PLATFORMIZATION AND NEWS

A Dissertation Presented

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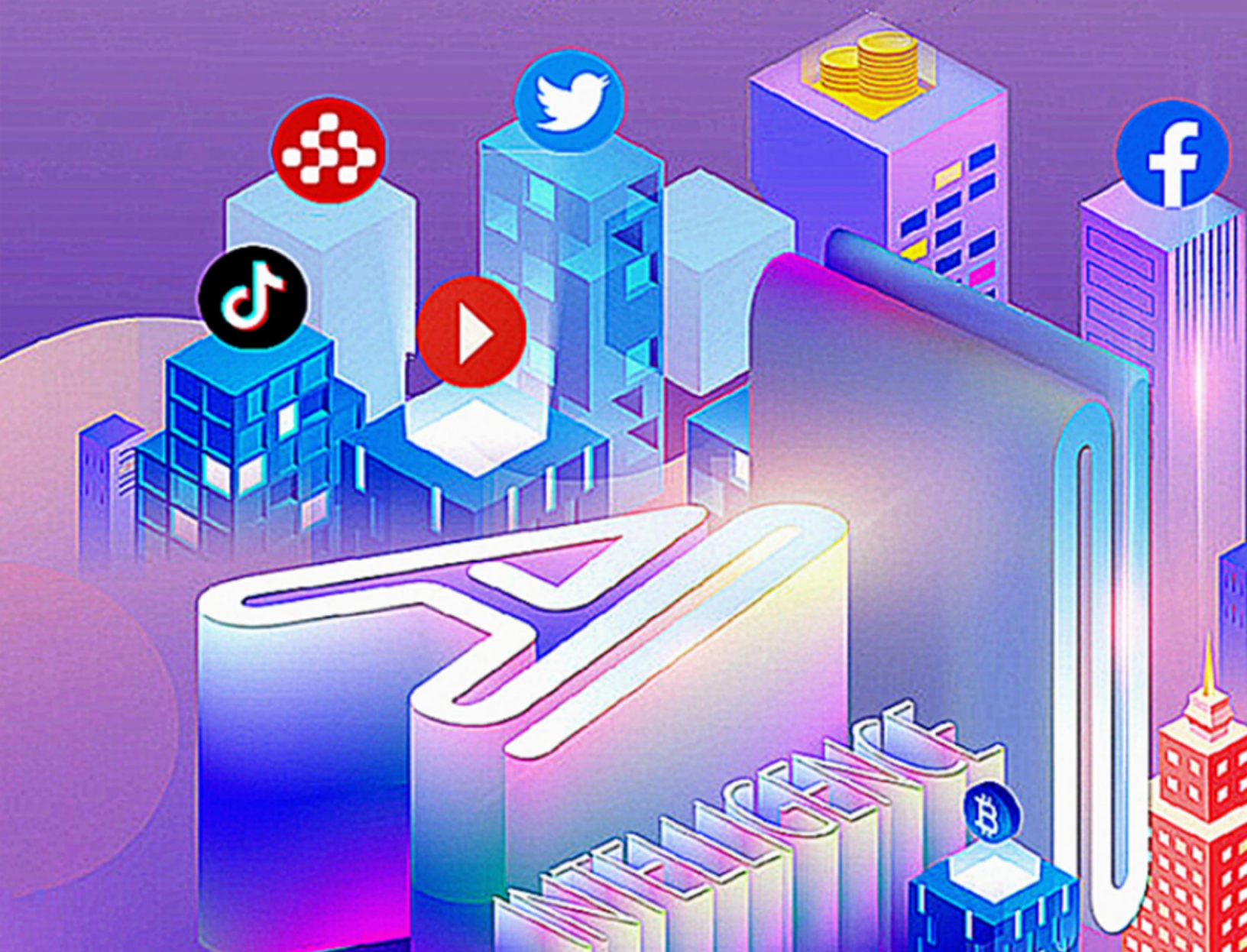
The logic of
PLATFORMIZATION AND NEWS



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The Logic of

PLATFORMIZATION AND NEWS

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Summary

Platformization is a phenomenon and an approach to understanding the interaction of platform participants, the interplay of sociality, commercial activity, communication and politics etc. The trajectory from platform functionality to platform automation is a method of platformization that has been gaining power since the inception of Web 2.0, functioning in the sphere of media evolution and perception of political construction, with the circumstances of changing journalism profession.

As normally considered mainstream media and content, TV news is facing the challenge from digital platforms. Whereas, it is also a chance to evolve TV news and its framing across digital platforms. Under these circumstances, TV news shows the potential to influence political affection, attitude and behavior. And the implications of TV news consumption have raised a polemic that whether TV news fosters political alienation or enhances political involvement on the contrary. Meanwhile, political participation is deposed to network and personalization under the integration of digital context, and concurs with activation and operation of mobile journalism. In the concurrence, mobile mediality is being shaped, sociality has the propensity for being platform-based, engagement momentum is theoretically possible.

Thus, the new communication paradigm is proposed by virtue of platform logic, platform architecture, and associate network automation. Platform logic primarily refers to platform functionality, platform automation, mobile mediality, platform-based sociality, and the quaternions they constitute. Platform architecture casts platformized communication as the amorphous interaction. And CGTN news and CNN news are taken as cases to analyze the adoption of this communication paradigm.

To dissect the influence of platformization on journalism and news routines, the framework and ontology of AI journalism are built so as to explicate and instruct the emerging phenomenon in news ecosystem where intelligent machines and human journalists are coexisting. Specifically, (1) automated news event detection generally applies log-based method, content-based method, and structure-based method, and evolves from single-factor detection to multi-factor detection, depending on environment detection, targeted mediation and algorithmic institution; (2) automated news curation needs linguistic applications, narrative classification, and methodological conversion, based on AI journalism's latent turns from precision journalism; (3) intelligent news distribution is characterized by round-the-clock distribution and monitoring, interactive and communicative actions, flexible customization, etc. And the innate logic of this distribution is displayed through immersive personalization and interactive personification.

Sumari

La plataformización és un fenomen i un enfocament per comprendre la interacció dels participants de la plataforma, la interacció de la socialitat, l'activitat comercial, la comunicació i la política, etc. La trajectòria des de la funcionalitat de la plataforma fins a l'automatització de la plataforma és un mètode de plataformización que va començar a poder des de l'inici de Web 2.0, que funciona en l'àmbit de l'evolució dels mitjans i la percepció de la construcció política, amb les circumstàncies de la professió periodística canviant.

Com normalment es consideren mitjans i contingut convencionals, les notícies de televisió s'enfronten a el desafiament de les plataformes digitals. Atès que, també és una oportunitat per evolucionar les notícies de televisió i el seu enquadrament en les plataformes digitals. En aquestes circumstàncies, les notícies de televisió mostren el potencial d'influir la política, l'actitud i el comportament. I les implicacions de l'consum de notícies televisives han generat una polèmica que si les notícies televisives fomenten l'alienació política o per contra, milloren la participació política. Mentrestant, la participació política és deposada a la xarxa i la personalització sota la integració de l'context digital, i està d'acord amb l'activació i operació de l'periodisme mòbil. A el mateix temps, s'està formant la medialitat mòbil, la socialitat té la propensió a estar basada en la plataforma, l'impuls de compromís és teòricament possible.

Per tant, el nou paradigma de comunicació es proposa en virtut de la lògica de la plataforma, l'arquitectura de la plataforma i l'automatització de la xarxa associada. La lògica de la plataforma es refereix principalment a la funcionalitat de la plataforma, l'automatització de la plataforma, la medialitat mòbil, la socialitat basada en la plataforma i els quaternions que constitueixen. L'arquitectura de plataforma presenta la comunicació plataforma com la interacció amorfa. Les notícies de CGTN i les notícies de CNN es prenen com a casos per analitzar l'adopció d'aquest paradigma de comunicació.

Per disseccionar la influència de la plataformización en el periodisme i les rutines de notícies, el marc i l'ontologia de l'periodisme AI es construeixen per explicar i instruir el fenomen emergent en l'ecosistema de notícies on les màquines intel·ligents i els periodistes humans coexisteixen. Específicament, (1) la detecció automatitzada d'esdeveniments de notícies generalment s'aplica un mètode basat en registres, un mètode basat en contingut i un mètode basat en estructures, i evoluciona de detecció de factor únic a detecció de factors múltiples, depenent de la detecció de l' entorn, la mediació dirigida i la institució algorítmica; (2) la curació automàtica de notícies necessita aplicacions lingüístiques, classificació narrativa i conversió metodològica, basada en els girs latents de l'periodisme d'intel·ligència artificial des del periodisme de precisió; (3) la distribució intel·ligent de notícies es caracteritza per una distribució i monitoratge 24 hores, accions interactives i comunicatives, personalització flexible, etc. I la lògica innata d'aquesta distribució es mostra a través de la personalització immersiva i la personificació interactiva.

Sumario

La plataformización es un fenómeno y un enfoque para comprender la interacción de los participantes de la plataforma, la interacción de la socialidad, la actividad comercial, la comunicación y la política, etc. La trayectoria desde la funcionalidad de la plataforma hasta la automatización de la plataforma es un método de plataformización que empezó a poder desde el inicio de Web 2.0, que funciona en el ámbito de la evolución de los medios y la percepción de la construcción política, con las circunstancias de la profesión periodística cambiante.

Como normalmente se consideran medios y contenido convencionales, las noticias de televisión se enfrentan al desafío de las plataformas digitales. Considerando que, también es una oportunidad para evolucionar las noticias de televisión y su encuadre en las plataformas digitales. En estas circunstancias, las noticias de televisión muestran el potencial de influir la política, la actitud y el comportamiento. Y las implicaciones del consumo de noticias televisivas han generado una polémica de que si las noticias televisivas fomentan la alienación política o por el contrario, mejoran la participación política. Mientras tanto, la participación política es depuesta a la red y la personalización bajo la integración del contexto digital, y está de acuerdo con la activación y operación del periodismo móvil. Al mismo tiempo, se está formando la medialidad móvil, la socialidad tiene la propensión a estar basada en la plataforma, el impulso de compromiso es teóricamente posible.

Por lo tanto, el nuevo paradigma de comunicación se propone en virtud de la lógica de la plataforma, la arquitectura de la plataforma y la automatización de la red asociada. La lógica de la plataforma se refiere principalmente a la funcionalidad de la plataforma, la automatización de la plataforma, la medialidad móvil, la socialidad basada en la plataforma y los cuaterniones que constituyen. La arquitectura de plataforma presenta la comunicación plataforma como la interacción amorfa. Las noticias de CGTN y las noticias de CNN se toman como casos para analizar la adopción de este paradigma de comunicación.

Para diseccionar la influencia de la plataformización en el periodismo y las rutinas de noticias, el marco y la ontología del periodismo AI se construyen para explicar e instruir el fenómeno emergente en el ecosistema de noticias donde las máquinas inteligentes y los periodistas humanos coexisten. Específicamente, (1) la detección automatizada de eventos de noticias generalmente aplica un método basado en registros, un método basado en contenido y un método basado en estructuras, y evoluciona de detección de factor único a detección de factores múltiples, dependiendo de la detección del entorno, la mediación dirigida y la institución algorítmica; (2) la curación automática de noticias necesita aplicaciones lingüísticas, clasificación narrativa y conversión metodológica, basada en los giros latentes del periodismo de inteligencia artificial desde el periodismo de precisión; (3) la distribución inteligente de noticias se caracteriza por una distribución y monitoreo las 24 horas, acciones interactivas y comunicativas, personalización flexible, etc. Y la lógica innata de esta distribución se muestra a través de la personalización inmersiva y la personificación interactiva.

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Introduction

The digital tsunami and information pandemic are coming, we suppose, with the transition from the second media age (Poster, 1995) to the emerging media age of uncertainties in public sphere, political participation and communication, from two-way transmission to platformized interaction[1], from decentralized communication to kinesis[2] communication (e.g. Amazon Kinesis for processing streaming data), from technological panopticon to the fusion of platform surveillance and self-alienation socially and economically, and from the configuration of relation between human and machines to the inter-constitution of subjectivity of human and machines.

At the inception of a novel media epoch, upheavals might occur in globalization and anti-globalization, platform customization[3] and deplatforming, automation and robotization, liberation and exploitation, transition and evolution of great powers nationally and internationally, and of individual powers of platform participants. The classical mediatization theory, which forms the academic school at the beginning of new millennium (q.v. appendix A), seems too self-limited to model the emerging media and communication practices in public sphere, particularly with Artificial Intelligence (AI) and associated technologies. The efforts of revising the theory hence are attempted, such as grand mediatization, deep mediatization and hypermediatization (e.g. Pérez Tornero, 2020; Hepp, 2019).

Under the umbrella of mediatization and in order to organically integrate media automation to theory construction, we introduce *platformization* concept and theorize it from three perspectives, i.e. a communication paradigm, a reification of artificial intelligence (mainly embodied by platform automation), and an approach to dissecting media evolution. Helmond (2015) defines platformization as "the rise of the platform as the dominant infrastructural and economic model of the social web and the consequences of the expansion of social media platforms into other spaces online." From cultural production perspective, platformization by Nieborg et al. (2018) refers to "the penetration

of economic, governmental, and infrastructural extensions of digital platforms into the web and app ecosystems, fundamentally affecting the operations of the cultural industries." The notion of platformization in this study is expanded towards not only social media and related cultural and economic respects, but also the fields of journalism routines, media evolution and the perception of social and political interaction and construction.

The manifestation and testimony of platformization is the hybridization (a) between individualization and massification, (b) between human journalists and intelligent devices, on account of platform logic and platform architecture which proffer a structural and systemic model to explain algorithmic institutionalization and discursive competition. *Platform logic* could be succinctly apprehended through the quaternions, i.e. platform functionality, platform automation, mobile mediality, platform-based sociality. *Platform architecture* scaffolds platformized communication as the amorphous form that to a certain extent transcends the restricted and/or delimited communication at specific and fixed space and time, and that is partly portrayed by immersive communication (Li, 2020), owing to virtual reality, AI, 5G, holography, cloud storage and computing, big data processing, etc.

Under the strategy of hybridization (Chadwick, 2013) with new humanist focus of enlightenment (Pérez Tornero et al., 2010) and endorsing platform logic emerging as cultural articulation of machines' alterity in news event detection, information generation and news distribution, this study to some extent overcomes difficulties with binary analysis of media evolution, such as new media versus legacy media, machinic heterogenesis[4] versus human sociality, autonomy versus heteronomy[5].

Based upon the premise that digital platforms are ubiquitous in everyday life and intertwined with news production and consumption, and are correlated with political participation; and taking account of TV news still playing crucial part in news consumption[6], this study aims to respond to queries on (a) *what platformization brings to TV news and political participation*, (b) *how platformization refigures news detection, curation and distribution*. Taking advantage of our multidisciplinary academic background and new humanism[7] perspective, we use literature review, case study and platform analysis

methods, and adopt transdisciplinary and anthropocentric approaches for the argumentation of this study.

(1) Digital platforms play crucial part in communication nowadays. Journalism espouses mobile and social platforms in news production and distribution, which has interlinkage with political participation to some extent. There is a need for theoretical framework and systemic model to analyse the interrelation and platform's influence on mediality, sociality and structurality. The *chapter 1*, *chapter 3* and *chapter 4* are logically complementary and attempt to theorize platformization as a communication paradigm in order to explicate the rationale behind the interaction between digital platform, mobile journalism, political participation, and society in general. We argue that platformization paradigm derives from mediatization theory and consists of platform logic and platform architecture.

(2) Premised upon the notion that TV news production and distribution mediate the relation of news users and political participation to a certain extent, *chapter 2* and *chapter 5* discuss political implications of TV news dissemination via digital platforms, and the application of platformization while balancing platform logic, media logic, news logic, political logic and commercial logic. We find more specifically that the interrelation of TV news and digital platforms exists, nevertheless the attitude towards it divides; and the interaction of TV news and digital platforms strengthens the impact of TV news on political expression and participation. We also take CGTN and CNN as cases to analyze the acquisition of platform logic and platform architecture.

(3) Platform automation is being introduced into news routines, and a case in point is AI adoption in journalism. Considering the transformations of news routines and news ecosystems when introducing AI to journalism, the concern is being raised about the contradiction and relations between AI and human journalists. Specifically, the major transformations AI brings to news systems are automated writing, personalization at scale, and hybridization of AI and human journalists. The repercussions are that some journalism tasks and even jobs are automated, while incurring the conundrum between empowerment of AI and disfranchise of humanity. If not theoretically addressed properly, journalism

practices have the risk of falling into pure reductionism and functionalism. To avoid this, we propound in *chapter 6* a new framework, i.e. AI journalism, based on the studies of news automation. And the theoretical framework instructs the AI-adopting process and integrates the cross-domain knowledge. We also propose, in *chapter 7*, to build AI journalism ontology that can manifest the emerging phenomenon in news ecosystem where intelligent machines and human journalists are coexisting.

(4) In order to clarify journalists' misunderstanding on automated news curation, especially on the Natural Language Process/Generation, and to ease AI malaise and instruct the journalistic activities with AI, *chapter 9* is dedicated to elucidating the journalistic background of automated news curation, and proposes the methodology of artificial language philosophy and therapeutic approach. We argue that the methodology for automated news curation should be able to alleviate the tension between human journalists and AI. Concerning the opacity of automated news curation, we introduce linguistics and narratology to clarify the obscurity and summarize several representative narratives for automatically curating news.

(5) In the process of platformization, the quarternions of platform logic are not deemed to proceed equally. With respect to the employment of AI in news event detection and news distribution, platform-based sociality and mobile mediality accentuate the news bots/robots social identity constitution, communicative flexibility, personalized institution, and media simulation of reality. We identify in *chapter 8* that news event detection methods evolve in academia from single-factor detection to multi-factor detection, and human journalists need to update their mindset for detecting news event through semantic web. Through user-centric prism, intelligent news distribution is examined in *chapter 10* and exhibited via immersive personalization and interactive personification.

Methodologically, this study also makes a contribution, apart from the arguments above, to platform analysis by developing the analyzing tool by factorizing platform logic as four variables, i.e. functionality, automation, mediality and sociality. Moreover, the method is used in chapter 5 to give a brief accessment on the platformization degree of CGTN and CNN. By this method, we find that CGTN and CNN both have set up their

platform ensemble, channel ensemble, and similar content module. They realize platform functionality mainly via official websites and their own APP, while depending chiefly on third-party platforms to actualize platform automation, mobile mediality and platform-based sociality.

The objectives of this study are to first theorize platformization as a framework in communication field and public sphere, and then apply this theory to analyze TV news by taking CGTN news and CNN news as cases, and finally model the new form of journalism platformization as AI journalism. By doing so, this study broadens new horizons for inspecting the interactions of digital platforms, news and public sphere. It envisions the interaction from four angles, i.e. culture criticism, institutionalization, functionalism and technological materiality. The platformization theory is instrumental in proffering a new prism through which to apprehend AI news ecosystems and business models, AI media education and literacy, platform ethics and regulation, platform discourse and current political scene, automated culture and knowledge production, datafication and platform fandom, infopower and platform inequality, etc.

Notes

1 For instance, interpersonal communication with platform as an interactional node.

2 We extend the meaning of kinesis to the sphere of communicative interaction and institutionalization, foregrounding platform user's social, emotional and sensorial participation.

3 For instance, personalized affordance of platform content, platform logic and platform architecture.

4 The critique of humanist positions by Guattari (1993).

5 From the vantage point of political economy and platform capitalism.

6 For instance, see Jigsaw Research. News Consumption in the UK: 2019. Fieldwork dates: November 2018 and March 2019. Published: 24 July 2019. https://www.ofcom.org.uk/__data/assets/pdf_file/0027/157914/uk-news-consumption-2019-report.pdf

7 In a narrow sense, the second renaissance of humanism from post-modernity (Poster, 1995) and accompanied technologies (e.g. AI, virtual reality).

Part Ⅰ Platformization as a paradigm for communication studies

Platformized Communication:

What platformization brings to TV news and political participation

Chapter 1
Digital Platform and Platformization

1.1. Multifaceted settings and political communication perspective

Platforms are generally accepted as cores and bases to make components and communication. Gillespie (2010) takes the angles of etymology and semantics to reveal the elementary meaning of platform as "a 'raised level surface' designed to facilitate some activity that will subsequently take place" from four semantic territories: computation, architecture, figuration and politics. He suggests all the four semantic meanings explain why online content-hosting intermediaries undergird platform's specificity and flexibility. YouTube exemplifies his comprehension that platform "is designed as an open-armed, egalitarian facilitation of expression, not an elitist gatekeeper with normative and technical restrictions."

Baldwin et al. (2008) emphasize that platform is formed by the architecture system and the embedded interfaces, and identify three main settings among the uses of platforms, namely product development, technology strategy, and industrial economics. Despite the different implications of platforms in disparate settings, they attempt to draw the common grounds that platforms comprise core components with low variety, and peripheral components with higher variety. Apart from these three main settings, sociological and political settings should also be taken into account.

Platforms are multidimensional demonstrated in different settings, and characterize multiple perspectives. Habermas (1989) discusses the public sphere as a platform for advertising. The platform in his context is a special realm where commercial circulation and public communication are balanced, whilst the demarcation between public sphere and private sphere are blurred. In respect of legal term clarified in Section 230 of the

Communications Decency Act[1], platform is an "interactive computer service" that "means any information service, system, or access software provider that provides or enables computer access by multiple users to a computer server, including specifically a service or system that provides access to the Internet and such systems operated or services offered by libraries or educational institutions." In the economic aspect, Langley and Leyshon (2016) remark on the digital economic circulation and platform capitalism by thinking of the platform "as a discrete and dynamic arrangement defined by a particular combination of socio-technical and capitalist business practices," and foreground the "infrastructural and intermediary qualities of the platform". Srnicek (2017a; 2017b) considers that Facebook, Amazon, Google and Uber exemplify a nebulous series of entities called platforms[2]. The platform is regarded by him as a "newly predominant type of business model premised upon bringing different groups together" which is conducive to platform economy and platform capitalism. Zeng (2015) takes Taobao as an instance to outline the paradoxes of building platform ecosystem, and underlines that platforms evolve in business setting depending on strong product, profound customer value, market potential and well-partitioned functionalities. Tiwana et al. (2016) propound the neologism of "platform governance" to analyze platform-centric ecosystem, and suggest platform owners should find the delicate equilibrium between retaining sufficient control to ensure the platform´s integrity and relinquishing appropriate control to encourage innovation by the platform´s module developers. Hoelck and Ballon (2015) concentrate on the technology and OTT (Over The Top) platforms and lay stress on the mediating feature of platforms which are the entities creating value by enhancing interactions between agents in digital market.

Digital platform is a genre of platforms, which is confined in the digital field whilst exerts influence on many aspects of social practices. What fundamentally identifies the digital platform from other platforms is the digital technology it applies. Digital platform denotes the digital and technological system which provides technical and corporeal resources, interfaces and connections to fulfill certain aims and functions. A typical digital platform consists of software, firmware or hardware architectures, a software stack, programming languages, related software components, and a graphical user interface (Jansen, 2013). Digital platform is the epitome of a burgeoning communication paradigm --

platformized communication paradigm which follows mass media communication paradigm and multimedia communication paradigm, and allows instantaneous, autonomous, interactive and reprogrammable information transfer (Sheller, 2015; Halupka, 2016). This paradigm is grounded on both centralized mass information distribution and information dissemination of capillary reticulation (Pérez Tornero et al., 2010).

Propelled by the demand of continuous integration (CI) and agile software development, digital platforms are showing a cross-platform feature and generally composed of platform-independent code and platform-specific code (Hsieh et al., 2015). This cross-platform feature is consolidated by the "one web" principle established by the World Wide Web Consortium (W3C) standards committee for web browsing platforms, stipulating that "web application users should be provided with the same information and services irrespective of the device on which they are operating." (Choudhary er al., 2014)

As well as cross-platform feature, digital platform is characterized by openness, modularity, and extensibility. In consideration of platform usability, programmability and compatibility, digital platform turns out to be software-ecosystem oriented. In software ecosystem where "a set of actors functioning as a unit and interacting with a shared market for software and services, together with the relationships among them," (Jansen, 2013) the competition for market is not only on the technical affordance but also the capability to keep platforms open, modular and extendable so that the network of third-party support has the potential to be fostered.

In political setting, in spite of the fact that many political parties, organizations and the citizenry extensively apply the existing social network platforms to political campaigns and political actions (e.g. Enli et al., 2013; Theocharis et al., 2015), customized political engagement platform, for example NationBuilder (McKelvey et al., 2016), has imposed reciprocal influence on developers, party activists, consultants on account of its on-demand and all-in-one solution: manage the campaign's email, website, voter database, donations, volunteer coordination, and communications on one platform.

Digital platform specifically plays a significant role in political mobilization among all the political engagement, and is usually accepted as the avenue and approach to political

activities. However, platforms are not merely "utilities or conduits that simply channel circulations." (Langley et al., 2016) Accompanied by the autonomous content production and distribution[3] (Kim et al., 2016), digital platform is inclined to some extent to bypass the political participant in consequence of artificial intelligence. Relying upon the algorithm, the character of digital platform in political communication is perplexed between the pathway to political participation and acting as the subjective percipient. This confusion also comes with the overlapped role of audience in political communication sphere, inasmuch as the audience play parts of both senders and receivers of political information via digital platforms to "participate in the creation, sharing and interpretation of news, information and opinions." (Picone et al., 2015)

1.2. From platform functionality to platform automation

Functional visibility is a vital commonality for multiple platforms. The evolution of platform stems from affording functionality[4]. Platform companies are demanded to facilitate functional complementors (Cusumano, 2010) in order to add platform functionality and "sticky" content (e.g. Cormode et al., 2008). Since the advent of Web 2.0, the Internet has been regarded as a fundamental and primary digital platform or meta-platform (Tsekeris et al., 2012; Helmond, 2015). Web 2.0 proffers functionalities of the openness of participation, the dimension of social interaction overcoming time and space (Papsdorf, 2015), and the means of "prosumption" (Ritzer et al., 2010). On top of that, platform functionality has taken effect since the very beginning of platform building. In the 1990s, in-house platform emerged as "a foundation or base of common components around which a company might build a series of related products" (Cusumano, 2010), and provided functionalities of modular product architectures and component reuse.

The progress of platform is particularly boosted in the context of Web 2.0, and shaped in the automated communication field (Papsdorf, 2015) where communication is mediatized and information is automatically transmitted and sometimes produced. Comprised of background-support automation and content-provide automation, platform automation is more accentuated than platform functionality in this progress contemporarily,

although automation is based upon functional maturity of platforms. As a consequence, person interaction is prone to be supplanted by platform interaction, which reduces the frequency of direct interaction of person-to-person, and contrarily increases the chances of communication between persons and machines. And platformization emerges as the influence of platform functionality and platform automation exerts institutional potential on culture and ideology, business and political economy, technology and software, journalism and communication, and other domains (Nieborg et al., 2018; Helmond, 2015; Karatzogianni et al., 2020; Nieborg et al., 2019).

The trajectory from platform functionality to platform automation is an inner method of platformization, which concurs with the transformation from social interaction that "characterized by subjectivity to one that is dominated by objectified criteria." (Papsdorf, 2015) In view of the exposition of HTML, XML, social media API and programmability, Helmond (2015) contends that platformization refers to "the rise of the platform as the dominant infrastructural and economic model of the social web and the consequences of the expansion of social media platforms into other spaces online." Platformization is defined by Nieborg et al. (2018) from cultural production perspective as "the penetration of economic, governmental, and infrastructural extensions of digital platforms into the web and app ecosystems, fundamentally affecting the operations of the cultural industries." Whereas, platformization is not deemed to be constrained to simply comprehend social media, but also functioning in the sphere of media evolution and perception of the social and political construction, occurring under the circumstances of the changing journalism profession (e.g. Burum, 2016; Lenzner, 2014) and the diversified prototypes of communication (Jensen et al., 2017). The notion of platformization is also strategically applied to the industry-wide platforms such as Microsoft Windows, Mac operating system and personal computers. An industry-wide platform´s components are likely to be supplied by diverse companies or different departments of the same firm (Cusumano, 2010). This economic model of industry-wide platforms is, of necessity, part of platformization by holding together infrastructures, affordances and intermediaries.

Platformization is situated thereby as the realization of platform ecosystem where the appetite for data and network effects[5] play crucial parts, characterized by " the

interdependence and interoperability of platforms" (Dijck, 2013). Moreover, social media platforms and social attributes are active components in the process of platformization (Cusumano, 2010). With reference to the definition of ecosystem-based software platform by Jansen (2013), platform ecosystem is a collection of software and hardware artifacts that form a coherent whole on which applications can be built endogenously and exogenously. Platform ecosystem is distinguished from industry-wide platform by the effectuation of network effects, and constituted by intermediaries, functional complementors, workers, users, regulatory authorities, judiciary and entrepreneurs when network effects encourage more users and complementors to adopt platforms (ibid.).

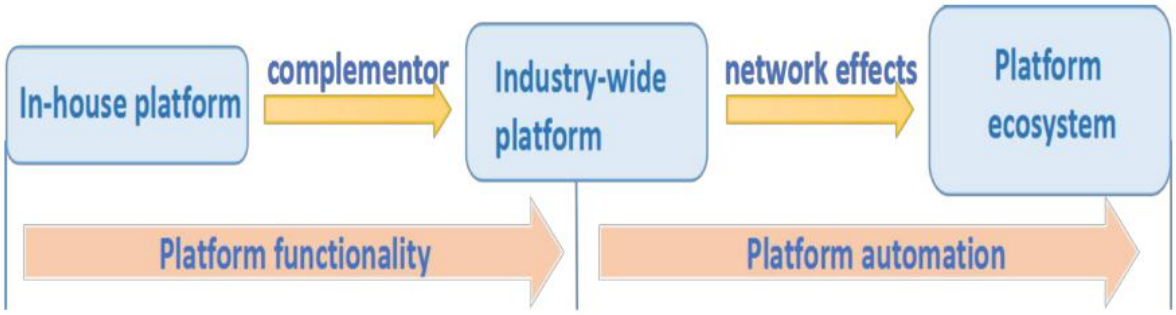

Figure 1.1 Trajectory of platformization. Source: Own elaboration.

Platformization has the innate appetite for data. The pursuit of data, in turn, imparts impetus to platformization (Srnicek, 2017b). Platforms act as intermediaries following a triangular logic that mediates platforms per se and data exchangers for the purpose of minimizing transaction costs and seeking economic and political power, which accelerates the course of platformization (Hoelck et al., 2015; Srnicek, 2017b). In order to commodify user activities, the infrastructural and technological framework of platformization grapples with the setbacks from regulations and the competitive situation for extracting data, due in

some part to capitalist imperatives (Srnicek, 2017b), through "decentralizing platform features and recentralizing platform ready data" (Helmond, 2015).

Albeit with the counteractions from the capitalist imperative of monopoly and impingement upon privacy, the dynamic of platformization consists in the virtuous circle (or positive feedback loop) resulting from network effects. As a result of the data-centric logic in business model and the reliance upon network effects, platformization accommodates internal expansion and territorial extension (e.g. Helmond, 2015) by virtue of digital platform's central position of offering connections and exchanging data (Srnicek, 2017b; Hoelck er al., 2015), which conduces to make sense of the connection between digital platforms, TV news and political communication.

1.3. Conclusions

Platformization is a phenomenon and an approach to understanding the interaction of platform participants, the interplay of various sectors of architecture, economy, communication and politics etc., and the interlinkage of different disciplines of politics and communication, marketing and management, data science and software engineering, laws and regulations. The trajectory from platform functionality to platform automation is a method of platformization that has been gaining power since the inception of Web 2.0, functioning in the sphere of media evolution and perception of political construction, with the circumstances of changing journalism profession.

Notes

1 https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=47-USC-1900800046-1237841278&term_occur=999&term_src=title:47:chapter:5:subchapter:II:part:I:section:230

2 Srnicek (2017b) expounds that platforms are digital infrastructures that enable different groups to interact. These groups include customers, advertisers, service providers, producers, suppliers, and physical objects. And usually with tools, these platforms enable users to build their own products, services and marketplace. In the platform landscape, Srnick (2017b) asserts, platforms are presented in five types: advertising platforms, cloud platforms, industrial platforms, product platforms, lean platforms.

3 For example, algorithm generated content.

4 Including platform affordances and services such as software as a service (SaaS) and application platform as a service (aPaaS), normally based on cloud computing. Regarding AI, emerges machine learning as a service.

5 Network effects are reflected on the logic that (a) more users means more value; (b)the participation on one side of companies' market relies on the participation of the other side of the market; (c)the winner takes all or the majority(Srnicek, 2017b; Cusumano, 2010&2011; Hoelck et al., 2015)

Chapter 2
Platform Dissemination of TV News

The conditions and circumstances of TV news, political communication and political participation are changing with the development of digital platforms. Digital platforms of TV news are showing their increasingly influential functions in the fields of political communication and participation mainly by two means: employing information technology and conveying content of TV news.

However, the research that discusses the communication of TV news on digital platforms in the facets of political communication and political participation is very scattered and needs to be taken further theoretically. The content following gives contours of the correlation and interaction between political communication, political participation, TV news and digital platforms.

2.1. Interrelation between TV news and digital platforms

The interrelation of TV news and digital platforms exists which is normally accepted, nevertheless the attitude towards it divides. As the complement of classic TV news broadcast channels, digital platforms lead to a "second screen" phenomenon. The phenomenon means using the screen of mobile phones, tablets, etc, other than the screen of TV, to participate in the interaction and discussion through such social media as Facebook, Twitter, while following a television program on TV. This phenomenon mirrors a positive relationship between TV news and digital platforms, which results in an optimistic standpoint.

Giglietto et al. (2014) discuss the second screen phenomenon and political participation, and posit that the relationship between Twitter and television is increasingly symbiotic. Twitter plays as a real-time backchannel for audiences to express thoughts and make comments while watching a TV program. The Tweets related to the political TV show

produce more during the airtime. Networked public spaces are established by digital platforms, which in turn is beneficial to boosting the distribution of TV programs and improving their influence.

In the view of political economy, the interrelation of TV news and digital platforms is pessimistic though. Higgins-Dobney et al. (2013) assume that the growth of technologies applied in TV news causes the demise of journalism profession, because it "invokes such issues as technology-based layoffs, reductions in status (full-time to part-time), reduced real income and benefits for crew, multitasking without commensurate pay, disregard [for] professional knowledge and experience, and abrupt dismissals of long-term talent and other employees." Moreover, alongside digital platforms and the pressure of the speeding-up and intensification of news production that digital platforms bring, journalists are prone to excessively rely on digital platforms to search information and conduct investigative reports, which possibly results in the storytelling of lacking creativity and depth.

On balance, the access to TV news shows a propensity to be incidental to social media use. With the proliferation of entertainment choices (Arceneaux et al., 2013) and the development of content-abundant media environment, at least in the UK, the scale of news audiences who watch traditional TV has diminished, and the size of ones who view news in non-traditional ways has increased (Ofcom, 2015). Digital platforms partly account for the decline of TV news consumption, meanwhile contribute to the diverse and flexible distribution of TV news, both of which lead to the fragmentation of TV news.

TV news has more advantages than newspaper and radio news of fitting in the digital scenario naturally, because visualization (e.g. videos, graphics, photos), which can be much easier to be realized by TV news, becomes a prominent and inherent feature of digital media platforms. Facing changes of IT and digital platforms, TV news thus affords many online innovations. Weiss et al. (2014) examine the content of TV news' homepages and find that TV news makes innovation and efforts for the purpose of capturing audiences by digital platforms. It is posed in their research that how to evaluate TV news websites to the extent of applying digital platforms. They propose that these factors should be considered for the evaluation: editorial content, multimedia content, interactive content, user-generated

content, tablet and smartphone apps, social media channels, advertising and promotional content, and innovation adoption stage.

The practice of interrelating TV programs with digital platforms has been undertaken. Australian Broadcasting Corporation (ABC) made an attempt to connect TV shows with Twitter in order to foster national culture and promote social participation. The TV program launched by the ABC is named #7DaysLater, which is a narrative-based comedy program that engage its audience through social media to provide its content and produce its weekly program collaboratively. As a public service broadcaster, the ABC accounts for fulfilling its role as a cultural infrastructure facilitator by engaging information and communication technologies. However, as far as Hutchinson (2015) analyzed, it is not adequate to merely provide tools to participate in TV shows. The expertise of cultural intermediaries should be entailed to bolster the situation and enhance participation in national culture.

Normally, digital platform is the mediation between TV news and online political participation. Whereas, this inference is based on the connotation that TV and digital platform are separate devices and relatively connective, which is the preconceived comprehension. Information technology has been offering the possibility to enable TV to develop into an intelligent digital media platform, which hence is facilitating the transfer of the relationship between TV and digital platform from interaction to reconciliation.

The interaction between TV news and digital platforms benefits the effect of TV news on political expression and participation, because digital platforms provide a path to connect TV news to political communication. Yamamoto et al. (2015) note that it is meaningful that young adults frequently express political opinions on digital platforms based on what they learn from TV news, because of the interactive effect that online political expression has with TV news. Furthermore, a positive relationship between computer-mediated media use for news and political participation has been found (Gil de Zúñiga et al., 2015). Digital platforms, such as mobile phones, might play as the second screens for TV news to "provide audiences an opportunity to get more information, discuss, and elaborate on TV news," which "mediates the path from TV news consumption to online political participation." (Gil de Zúñiga et al., 2015).

2.2. TV news framing across digital platforms

News framing should comply with media logic. The digital media platform manifests its own media logic, which leads to various ways and patterns of producing and distributing content, using media, and what is more important, news framing. By conceiving that social media platforms are intertwined with network media logic, Klinger et al. (2015) compare the media logic of social media platforms with that of traditional mass media. After the analysis of network media logic in the realm of political communication, it is concluded that communication strategies for political actors on social media platforms are "increasingly differentiated and have more positive, personalized and emotional content" (Klinger et al., 2015).

Apart from the study in the aspect of media logic, the research into how news frames the coverage of election campaigns has been achieved with regard to the democratic value of strategic game framing and contestation framing. Strategic game framing is inclined to give prominence to the features of TV news which are likely to harm productive public deliberation. In contrast, contestation framing is more ambivalent because it is associated with more frequent reason-giving, though without many inclusiveness and civility in TV news discourse (Rinke et al., 2013).

Table 2.1 Comparison of mass media logic, network media logic and platform media logic. Adapted from "The emergence of network media logic in political communication: A theoretical approach," by Ulrike Klinger & Jakob Svensson, 2015, *New Media & Society*, 17(8), p. 1246.

	Mass Media Logic	**Network Media Logic**	**Platform Media Logic**
Production	Expensive information selection and content generation by professional journalists according to news values	Inexpensive information selection and content generation by users according to their individual preferences and attention maximizing	With barely marginal cost, information selection and content generation by the amalgamation of users, algorithms, and/or professional journalists according to individuality
Distribution	Content selected by expert/professional gatekeepers -- based established news values -- distributed to a paying fixed audience of subscribers; one-to-many mode	Users are like intermediaries, distributing popular content, sometimes like a chain letter, within networks of like-minded others; nodes-to-nodes mode	Platforms are intermediaries distributing personalized content via connecting various users(including online influencers), platform content and affordance complementors; the combination of one-to-many mode and nodes-to-nodes mode
Media Usage	Location bound mass audience with limited selective exposure oriented towards passive consumption of information, based on professional selection	Interest-bound and like-minded peer networks with highly selective exposure oriented towards interaction through practices of updating	Immersion-bound and responsive networks of constant self-configuration with platform-guided exposure oriented towards productive consumption of both content and affordance through information transition and social interaction

2.3. Effects of TV news on political communication

2.3.1. Affective, attitudinal and behavioral effects

Political communication, on the basis of the evolution of agenda-setting tradition, has influenced not only what people think about, but also the way people think and act (Wolfe et al., 2013). Regarding effects of political communication of TV news, the research sphere encompasses social effects (taking institutions, organizations, corporations, governments, etc. into consideration) and the impact of TV content on the minds and behaviors of recipients and communicators. Specifically, political communication of TV news takes effect through this routine: affective effects fuel attitudinal effects (Levendusky, 2013) and then affect behaviors.

Social identity is one of the key factors with respect to this routine. Cite partisan media as an instance. Invoking viewers' social identities helps partisan media shape how viewers see the other political parties. Partisan media achieve that by framing of the news primes and activating viewers ' partisan group identity (Levendusky, 2013). Interpersonal communication also reflects social identities in effects of news by some means. Recipients of news share a need to reassure themselves but do not seek argument with their peers, showing their tendency to seek views alike. Interpersonal communication may exert a stronger influence on the elaboration of news information than on the pure rehearsal of contents from the news (Sommer, 2013).

Another key factors influencing political communication and TV news are affections and political attitudes. For instance, a research of media's influence on psycho-physiological state of TV audience (Havrylets et al., 2013) reveals the differences of negative and neutral TV contents in affecting audiences' psycho-physiological conditions. Negative TV contents cause volunteers to react with more concentration, anger, fear, disgust and sometimes with contempt. While participants are watching neutral TV videos, boredom (distraction and looking aside, narrowing eyes movements, relaxed eyebrows) and contempt can be detected. Then Havrylets et al. (2013) discover "changes in well-being, activity, and mood of the participants after demonstrating them neutral and negative video plots: negative stories significantly worsened the mood of the participants, evoked greater

situational anxiety, accelerated heart rate, and increased the level of aggressiveness, although neutral stories caused more significant decrease of mental activity."

In respect of attitudinal effects of political communication and TV news, the bases of the relevant studies are to investigate how the information is processed by recipients and how the messages exert influence on opinions. Lewis et al. (2013) emphasize that recipients tend to internalize the implications of communication while forgetting its details. They postulate that "most mass political communication produces a mix of sizable short-term and small long-term effects. Sizable long-term effects occur only when communication is repeated over a long period of time." Besides, some findings are demonstrated as regards the tendency of attitude to partisan opinions. Like-minded media have a significant effect on how viewers see the opposite political views. Watching like-minded media makes viewers more negative toward the other party, such as less support for bipartisanship and less trust in the other side (Levendusky, 2013).

With regard to the behavioral effect, political participation, as one genre of political action, is actively correlated with selective exposure and habitual behaviors. As for selective exposure to online news use (Knobloch-Westerwick et al., 2014), political participation increases when participants engage in selective exposure to attitude-consistent information. Contrarily, reduced selective exposure to consonant information diminishes participation.

Preexisting political attitudes, to a certain extent, confine the selection of TV shows and the exposure to TV news, which in turn influence political behaviors. Arceneaux et al. (2013) argue that if the audiences who tune into political biased TV shows already have strong and extreme opinions on political issues, seeing biased discourse on either their side or the other side may do little to increase any further resistance to opposing arguments.

2.3.2. Political implications of TV news consumption

Apart from the routine mentioned above, one important issue about effects of political communication of TV news is how to find the perfect extent and degree to disseminate political news, in order to acquire satisfying consequences of boosting political

participation and obtaining political trust effectively. The effect of TV news consumption and political participation is more nuanced than normally thought. The relation between news and politics considerably conditions the state of news consumption and political participation. The generally accepted view concerning this relation is that news and politics are positively correlated, whereas the existence of people who purposefully limit their news consumption (Woodstock, 2014) reveals a different circumstance: excessive news consumption possibly leads to adverse effects of political communication.

Woodstock (2014) calls these people as news resisters and contend that "decreased news consumption positions resisters to participate in public life", which is exactly the opposite conclusion compared to the dominant narrative about news and democracy. The limited news contacts and consumption benefit news resisters achieving greater calm and purpose, a constructive attitude towards the present and future, a willingness to work with others and engage in political participation.

Moreover, political disengagement emerges accompanied by the rising of partisan cable news in America (Higgins-Dobney et al., 2013), as the result of more selections of exposure to news and the phenomenon of media fragmentation giving Americans the option to tune out (Arceneaux et al., 2013). In accord with these points of view, "more news does not mean more democracy or a better informed public. Indeed, the inverse appears closer to reality." (Higgins-Dobney et al., 2013)

Many studies on the contrary are congruous with the assertion that TV news consumption is likely to lead to positive political consequences under some circumstances. The study focusing on Pakistani TV news channels has been conducted dealing with TV news consumption and its relationship with political participation, political knowledge and civic engagement of the youth (Mushtaq et al., 2015). It points out that watching TV news and political talk shows increases the level of civic engagement and political participation. The study considers that people who are socially active in high level civic engagement are inclined to show high level of political participation too.

Hence, the question has been raised that whether TV news fosters political alienation or enhances political involvement on the contrary, which is a traditional debate continuing.

Both traditions are actually reasonable under certain circumstances. Regular exposure to TV news is part of a process in which political interest, confidence, knowledge and engagement may cumulatively feed off each other. However, TV news also has the probability to encourage a sense of powerlessness, political disconnection and political disaffection during the same process (Curran et al., 2014).

Concerning news consumption and political trust, the effect of political communication is subtler and more complicated. From a historical perspective, the linkage was investigated between news media use and political trust by Strömbäck et al. (2016), based on the surveys conducted annually in Sweden since 1986. According to their discourse, the relationship between news media use and political trust is more positive in respect of watching public service TV news than watching commercial TV news. The conclusion of their article is that the relationship between news media use and political trust is generally positive regardless of changes and fluctuations across time, which is optimistic about media effects on political participation, though not completely persuasive and representative.

In addition to the examination of traditional forms of political participation in the actual society, the influence of news consumption on political participation that occurs online has also been reviewed by the study that treats openness to experience as a personality factor and investigates the relationship between personality, news consumption and online political participation. Individuals' online political participation, such as using online media to campaign for public or political issues, is associated with the degree to which participants are in the openness to experience (Jordan et al., 2015).

2.4. Conclusions

As normally considered mainstream media and content, TV news is facing the "second screen" challenge from digital platforms, specifically social media and digital native media. Whereas, it is also a chance to evolve TV news and its framing across digital platforms. Under these circumstances, TV news shows the potential to influence political affection, attitude and behavior. And the consequence of TV news consumption has raised a polemic that whether TV news fosters political alienation or enhances political involvement on the contrary.

Chapter 3
Platform-mediated Political Participation and Mobile Journalism

3.1. Mobile journalism

Mobile journalism is defined by Burum and Quinn (2016) as "an innovative form of reporting where people use only a smartphone to create and file stories". With development of portable intelligent devices, mojo (mobile journalism, and its corollary, mobile journalist), in the perspective of journalism and communication, is one category of reporting where professionals and citizens primarily use mobile devices (including smartphones, tablets, etc.) to create, file or disseminate stories which are in any format of video, audio, photo and text (q.v. appendix B). Mojo manifests the potential as an important digital literacy and an approach to bridge spheres of communication in schools, communities and the journalism profession (Burum, 2016). Partly owing to the convenience of creating and proliferating compelling stories and politicized content, mojo shows the propensity to deconstruct the traditional journalism and change the role of audience and public behaviors. It is also reconstructing sociality and "heralds a revolution in the way citizens can operate in the public sphere" (Burum et al., 2016), along with deconstruction of the traditional media routines. Mojo brings about an era when everybody owns the possibility to be not only a cameraman but also a journalist, and makes it possible that amateurs can report stories professionally and professional journalists can stay vigilant and produce news more conveniently and actively.

Media use and political participation are intimately related. And political activities are increasingly proceeding in the mediated environment. For instance, the preference for digital news platforms has strongly positive effects on both online and offline political participation (Bachmann et al., 2013). The content made by mobile journalists mediates political participation via digital technologies, which promotes political engagement of

politicians, citizens and organizations (Enli et al., 2013; McKelvey et al., 2016). Predicated upon the specific and unconventional motivations that social media platforms elicit to participate in politics (Wells et al., 2017; Lilleker et al., 2017) and the reciprocal rapport between online political expression and offline political protesting (Vissers et al., 2014a), mobile journalism is citizen-oriented and fuels political engagement. Against this backdrop, there seems to be a positive link between mojo and online political participation among young people, at least in some advanced democracies (Xenos et al., 2014). Nevertheless, social media use does not necessarily lead to political engagement (Park, 2013). Furthermore, the dissemination of mojo content through social media is inclined to assuage and weaken the effect of political engagement under some circumstances, compared to that of the content made and spread by traditional media (Schroeder, 2016).

To better understand this relation and shed light on the phenomenon, several issues are explored and discussed below. Firstly, considering platform-mediated political participation from the perspective of mobile journalism in platformization. Political participation demonstrates new traits when involving digital platforms and mobile journalism. These new traits derive from mobile devices as physical platforms for communication. Secondly, the interactive basis between mobile journalism and political participation. The confusing effect of propagation of mojo content upon political participation could be explained partly from the aspect of interactive basis between mobile journalism and political participation, particularly in the process of platformization, as a result of the paradox between platform automation and citizen-user centralism and the contradiction between collective action and connective action.

3.2. Political participation with digital platforms

3.2.1. Integration into digital context

The engagement in politics increasingly furthers in scope and depth in the sequence of political expression, political discussion and then political participation. Digital platforms are liable to afford the environment and context for participants to actively engage in "creation, distribution, use, integration and manipulation of information" (Whittaker, 2016).

Due to the digital context, the hierarchies of society, politics, economics are less important, although still essential. In contrast, personally mediated actions are more crucial (Bimber et al., 2015).

Accordingly, political participation is being integrated with digital platforms, especially for youth political participation. Online media play a mobilizing role in the democratic process for young adults (Yamamoto et al., 2015). Contrary to the view that the youth feel apathetic about politics or democracy, young people are actually participating in politics in a more digital way, rather than disengaging in politics (Whittaker, 2016).

Social network sites represent the pillar of political participation in digital context. The practice of political participation, such as the independence referendum in Scotland, has proved the pivotal role of social networking. Through social media, users are likely to have connections with public and political actors, and be exposed to shared political information, thereby participating in political activities (Tang et al., 2013).

3.2.2. Participation being networked and personalized

The proposition that social networks serve as channels of political mobilization has drawn considerable interest of political participation study (Lim, 2008). Social media platforms in particular exhibit noteworthy functions as indispensable parts of social networks in the arena of political participation, which contributes to featuring political participation as socially networked and politically personalized.

The realization of personalized political participation is to some extent based upon the premise that political participation is socially networked by digital platforms. Networked political participation bolsters and intensifies extreme political opinions by offering the appearance that expressing personal thinking and displaying characteristics of personal attitudes towards politics are likely to bring about identification and support, no matter how novel, absurd and aggressive the content of political opinions may be in most cases.

Arceneaux et al. (2013) find that “encountering a one-sided stream of pro-attitudinal information sends a strong signal about the accurateness of recipients’ initial position and boosts their confidence that the facts are clearly on their side”. Digital platform users have

the propensity to be subject to congregate individualization and collective polarization, which boosts the enthusiasm to be self-involved and cultivates the false conception that their political opinions and attitudes are widely accepted.

With interpersonal connections and associations with groups which are shaped and converge through social digital platforms, users of digital platforms show the likelihood to "express more aspects of their personalities, and even potentially develop new aspects" (Gil de Zúñiga, Copeland and Bimber, 2014). Political participants in digital scenario, as users of widespread digital platforms who hold diverse political opinions, have the possibility to be associated with each other, exchange opinions, and hence differentiate by the respective political attitudes along with aggregation.

With political participation becoming networked and personalized, political disagreement might survive more easily, "because each person's communication network consists of different sub-networks that rarely overlap" (Guidetti et al., 2016). Each person has more opportunities to achieve support in a sub-network, although the political opinions held in this sub-network can be the minorities in another sub-network. Therefore, "disagreement is socially sustained between the individuals connecting different sub-networks." (ibid.)

By virtue of the popularity of digital platforms and the extensive existence of political disagreement, political heterogeneity is encouraged. Political participation can be boosted, as the development of political heterogeneity. According to what Guidetti et al. (2016) argue, political participation is rooted in conflict and heterogeneity, since people tend to participate in politics more to defend or advance their interests especially when they feel that their interests are threatened.

3.3. Mobile mediality

Mobile devices for journalism are the tools used for news production and coverage. Apart from the instrumental usability for news reporting, mobile devices under some conditions have no sheer difference from professional cameras, specialized editing platforms and so forth. The prominence of mobile devices in mobile journalism is based on the functions of

mobility, connectivity (Aljazeera Media Training & Development Centre, 2017) and interactivity, which are increasingly giving rise to mobile mediality.

Sheller (2012) proposes the term of " mobile mediality " to emphasize the communicative flexibility that mobile communication technology brings into the "relations between people, communities, and places" (Humphreys, 2012). The connotation of mobile mediality is specified by Humphreys (2012) as "mobile interactions with social networks" in the environment that is online and offline interrelated and mutually constituted. Mobile mediality is vibrant where locality and mobility are transected, as well as public sphere and private sphere are intersected.

The locative and mobile transection is well captured and elucidated by the theory of mobile-digital situation (Seiler et al., 2016). As mobile social platforms are widespread (Pew, 2017c), self-existence and self-perception are correlated with others' co-presence not only physically but also virtually (Humphreys, 2012). This traversing of spatial and temporal limitations results in perpetual telecopresence, which constructs a structural peculiarity of mobile-digital situation (Seiler er al., 2016) where information receivers and emitters are mobile to access, analyze, evaluate and create transversal media content (Pérez Tornero et al., 2010).

When the locus is equivocal, the inherence of mobility is mediated and mobile aspect of media is reflected, especially for mobile journalism. Mobile journalism encompasses content producing, sharing, publishing (or broadcasting). And the publishing platform of mojo varies from traditional media to new media. In many cases, news made by mobile devices is apt to easily proliferate through mobile devices such as mobile phones, tablets, laptops and wearable computing devices (e.g. Mutsvairo, 2016), which probes the question that how to adjust the approach of making mojo and news content to social and digital platforms for the purpose of fitting the feature of mobile-digital situation. Meanwhile, there has essentially been a shift of news criteria, in terms of mobile journalism approach, to the spatial proximity which poses an anxiety over the missing out of efficacious services providing more comprehensive and sensitive understanding of stories (Westlund, 2013).

Therefore, Burum and Quinn (2016) put forward the approach of cross-platform and repurposing for a variety of screens.

The intersection between public sphere and private sphere is witnessed by digital media platforms and personalization of political campaigns. Mojo content and technologies tend to blur the boundary between vocational life and private life (Mabweazara, 2011), while granting private sphere civic quality (Papacharissi, 2010) and public sphere personal attribute (Enli et al., 2013). Online digital platforms, possessing civically reflexive architectures, fill in the gap between public sphere and private sphere (Papacharissi, 2010; Tenenboim et al., 2020). Using social media, political candidates for instance show the tendency to combine private identity and public persona for their political courses, and think highly of personal visibility in public sphere (Enli et al., 2013). This intersection can be defined as the personal media bubble (Pérez Tornero et al., 2010) which is an atomized organization for transmitting public information and experiences by networked private sphere (Papacharissi, 2010).

The production of personal media bubble resides partly in the praxis of mobile journalism. Giving credit to the photographing and filming as the manifestation of paying witness (Andén-Papadopoulos, 2014), the engagement with public sphere is enabled more directly (Blaagaard, 2013). Further, public discussion in the private social network gives presentation that political and public issues revolve around sensory experiences, lifestyle preferences, personal publics and communities (Andén-Papadopoulos, 2014; Nekmat et al., 2015; Schmidt, 2014). The bipolarity and malleability of public and private spheres construct tranversality which is emblematic of mobile mediality that empowers the common the aptitude to govern themselves (Burum, 2016) and regain their subjectivity and new humanism (Pérez Tornero et al., 2010) from power, notwithstanding the risk of being deprived of autonomy from platform automation and media civilization (ibid.). Digital social platforms are at the core of articulated communicative space where the code-enabled connections construct the process of expression, sharing and socializing (Schmidt, 2014).

3.4. Platform-based sociality

In platform ecosystem, many parties co-evolve and play out their functionality either proactively or coercively, paving the way from networked communication to platformed sociality (Dijck, 2013), as well as chasing the probability of connectivity. Digital platforms structure the interaction of sociality (e.g. Dijck, 2013) and conflation of identity (e.g. Lenzner, 2014) between mobile journalists and news consumers. Social platforms shape the connection of information terminals by sharing audiovisual content online as the repeated occurrence of mobile journalism (e.g. Burum et al., 2016). UGP and UGC link and travel different platforms, exhibiting the peculiar formats delivered across platformization. Contingent upon such situations, news tend to become more social (Johnston, 2016), at the very least morph into the duality of not only the content but also the carrier for daily contact in particular for viral stories (Picone et al., 2016), as digital platforms socializing.

Routinized social contacts either officially or trivially (Halupka, 2016) are inclined to come across political and public issues, on the basis of digital media platforms' evolution to allow frequent and casual communication as a function of personal and civil contexts (Pérez Tornero et al., 2010) among individuals and organizations (Vaccari, 2017; Maireder et al., 2017). For example, when using Twitter, platform participants and news consumers are likely to initially enable political discourse among activists, organizations and news media, and meanwhile to sustain the political movements taking place elsewhere (Theocharis et al., 2015). Given the above discussion from the perspective of political communication, platforms hence evince a likelihood of egalitarian, mediating and intermediary attributes which render new meanings of sociality (Dijck, 2013).

The connotation of platformed sociality referred to Dijck (2013) is the conflation of human connectedness and automated connectivity. As the result of the desire for data in the process of platformization, human connectedness is not playing the significant part as it should, compared to automated connectivity. This may lead to the lack of "tangible sociality" and the "missing social" on digital social platforms (Couldry, 2015) and bolster the simplification of human sociality to the sheer number of "likes", "friends" or

"matches", etc. In some cases, popularity principle[1], along with network effects, underplays the genuine social interactions and deep dialogues with reasonability and humanity.

Indeed, there is some evidence indicating that such technological logic is not as decisive as normally imagined. Heatherly et al. (2016) find that the degree of involvement in political discussions on digital social platforms is not entirely restricted by the technical affordance, but also individual motivations and characteristics. Additionally, considered as a more autonomous subfield of journalism by Burum (2016) and a genre of contents for platformized communication (q.v. section 4.1), mobile journalism is a style of neo-journalism that shifts "the focus away from a technological determinist view to one that posits the importance of digital storytelling skills and reflectivity" (Burum, 2016). Thus, it is necessary to reiterate digital platform literacy and new humanism (Pérez Tornero et al., 2010) of sociality on the base of platforms, which we call platform-based sociality. On the one hand, relational identity and connectivity (Seiler, et al. 2016) are underscored in this type of sociality. A constellation of flattened and horizontal contents (e.g. memes) label this sociality with informational visualization (Humphreys, 2012), on the other.

In light of platform-based sociality, it is forthright to contemplate a digitally emerging paradigm of participation so as to unfold the dynamics of digital platforms, mobile journalism and political participation. As aforementioned, digital platforms innately play as intermediaries and active participants in political course hinging on functional visibility, and boost the transmogrification from platform functionality to platform automation while stressing the data-centric logic, network effects and popularity principle. Platformization is so closely knitted with political participation that the practices of platform-based sociality of platform owners, of the traditional and new media, and of the average users actually embody the culture of participating, collaborating and co-developing (Couldry, 2015; Dijck, 2013).

What is undergoing in the terrain of platformization sheds light on the comprehension of new traits and configuration of political participation via digital platforms, and therein lies *platform-mediated political participation*. Citizens in the wave of platformization reflect possibilities to exchange views and attitudes with people of political divergence

(Heatherly et al., 2016). They have more inclination to mobilize and be mobilized informally and individually (Vaccari, 2017). They need more skillfully armed by media and information literacy for tracing information, information forensic examination and disseminating UGC (Pérez Tornero et al., 2010; Johnston, 2016). They face more participatory uncertainties with regard to controllability and unpredictability, radical and conservative courses, activism and slacktivism (clicktivism), democratic construction and destruction(Ahva, 2016; Halupka, 2016). At the mean time, the threshold is lowered for political participation (Vaccari, 2017), which arises the concern over platform literacy, the second layer of literacy regarding skills and motivations, and even participants' dispositions for the relevant comprehension and action.

Rather than restrained and customized in either political sphere or media space respectively (e.g. Couldry, 2015), in the era of platformization, participation may break through the barrier between political engagement and media involvement[2]. The confluence of platform-mediated political participation and mobile journalism emerges due partly to the widespread acceptance of digital platforms within many sectors and the intermediary effect of digital platforms across political and media sectors. Mobile journalism does not regard participation as merely journalistic artefact. Instead, it orients towards citizenship and political life through mobile media and journalism (Ahva, 2016) by accommodating "a flow of ambient live updates of ongoing situation" (Sheller, 2015). In this sense, production, consumption and distribution of news are the avatars of platform-mediated participation, especially during breaking news reports and emergent circumstances.

3.5. Engagement momentum and interactive basis

To a certain degree, mobile mediality and platform-based sociality are the consequences of the interaction between mobile journalism and platform-mediated political participation. Yet, the impact of these consequences is still disputable on the relation between mobile journalism production, digital platform consumption and platform-mediated political participation. Some scholars attribute it to the lack of general logic of connective action on social platforms (Couldry, 2015), ambivalent narratives of platform capitalism (Pasquale,

2016), as well as political responsive power over divergent and aggregated citizens of diffuse engagement and constrained attention during mediation (Schroeder, 2016). Notwithstanding exposing the urgency and interpreting the complication the process of platformization brings to the participative culture, these points of view are less convincing and less constructive to explain the phenomenon systematically and theoretically.

For this reason, we propose to explore the interactive basis of mobile journalism and platform-mediated political participation in the context of platformization, which consists of the dualism of duty norms and process norms, the contending for the subjectivity between technologies and citizens, and the contradiction between collective action and connective action.

Individual citizens now perform some of the institutionalized journalism functions (Hermida, 2010), for instance holding a phone to record what is happening and even to do the piece-to-camera (e.g., Garyantes et al. 2015). Accordingly, the overlapped identities between news producers and consumers offer mobile journalism participants, if they feel necessary and eager, chances to detach from the media institutional structure (Campbell, 2015) and obtain more autonomy and independence, whilst counting on the logic of platformization which purveys resources and on the contrary imposes restrictions with the dualism of duty norms and process norms within the participatory orientation (Pérez Tornero et al., 2010).

3.5.1. Are both mobile journalism and platform-mediated political participation citizen-user oriented?

Loader et al. (2014) theoretically assemble the networked young citizens and foreground the changing nature of duty norms of youth participation. The participatory norms before platform-mediated political participation taking part in political sphere are basically generated from regulatory obligations due to the political socialization (ibid.). Conventional political norms, including voting at elections, joining political groups and engaging with voluntary activities etc. (ibid.), are intervened by the uprising processual norms of participation (e.g. Halupka, 2016) which highlight self-actualizing, critical disposition and

declination of mainstream engagement (Loader et al., 2014), and fluidity and constituency of lived experience (ibid.).

The dualism of duty norms and process norms now are conterminous and coexisting, cognate with the pertinence between traditional platforms and digital platforms (Pew, 2017a&2017b). That helps to lead to the conundrum of identifying and balancing political correctness and self-actualizing (Major et al., 2016). Part of the answers for this seems to be the capacity of the global information networked citizenship (Loader et al., 2014) or active universal citizenship (Pérez Tornero et al., 2010), and the reflexion of the need and subjectivity of citizenry since self-presentation is a stimulus to online information sharing (Picone et al., 2016). Additionally, mobile journalism encapsulates the dualism in a domain where citizens are information provider and producer simultaneously (Campbell, 2015), and offers method to citizenship actualization (e.g. Lee, 2015) which fulfills political and civic obligation and attenuates the antagonism between political correctness and self-actualizing.

The contention over the relation between citizenship and journalism corresponds to the eras of transition from pre-platformization to platformization. The classical model of citizenship within journalism is that citizens are informed by journalists for participation and democracy (Campbell, 2015), which falls into the logic of pre-platformization. Whereas, as for the fluid model of citizenship within journalism (Loader et al., 2014), ordinary people are supposed to be franchised and voiced (e.g. Ivo, 2016; Campbell, 2015) by dint of digital platforms proliferating and diversifying content outside of authoritative power, although still administrated by the regulation of platform governance, platform mediation and platform hegemony. From this point of view, mobile journalism is not ended in the nexus of news production, attribution and consumption, but rather is filled over to the wider context of political participation and power allocation in which the logic of platformization and engaged citizenship play great roles.

3.5.2. Does the engagement momentum strengthen the link between mobile journalism and platform-mediated political participation?

Technologies and citizens are contesting the subjective dominance between each other when it comes to platform-mediated activities from the perspective of development of digital platforms(e.g. Kim et al., 2016; Barassi et al., 2012). Subsequently, platform automation and mobile mediality make the purview of journalism, platform accessibility and media exposure not explicitly marked. Media production and consumption are likely to pragmatically and instrumentally inspected through the lens of participatory practices (Barassi et al., 2012) in pursuance of constructing the legitimacy of platform-related journalism, insomuch as these participatory practices are now apt to be considered in a spectrum as both controlled and unpredictable (Ahva, 2016), both destructive to political statement and constructive of energetic democracy or polity in some conditions (Halupka, 2016).

Mobile journalism is counted as participatory engagement in two inquiries: first, presence and recognition of news producing and dispersion; and more importantly power distribution and rights equalization (e.g. Burum, 2016). The focus on mobile practices from either political or journalistic orientation helps to avoid the overemphasis of the constructive and organizing role of institutions, fill the gap between engagement, news consumption and everyday life (Ahva, 2016; Burum et al., 2016), and evince the visibility of the second inquiry of mobile journalism. However, such practices as political participation via mobile journalism with digital platforms are criticized lacking online and offline consistencies and exerting unclarified impact beyond journalistic context (Vissers et al., 2014b; Ahva, 2016) despite the well-noted campaigns (e.g. Anduiza et al., 2014; Theocharis et al., 2015). Delineating what fortifies the connection between mojo and platform-mediated political participation is the presupposition of explicating this bewilderment.

Participation is being lifted alongside other constitutes of mobile journalism (Ahva, 2016). And it is ostensibly evident that news production via mobile devices is also "an engaging and participative behavior" (Wei et al., 2015). The prosumption of news that is "being gathered and disseminated on platforms" (Johnston, 2016) becomes a genre of

practices for social connection (Picone et al., 2016) and a kind of behaviors for information acquisition and consumption (Picone et al., 2015; Lee, 2015). As such, the criticism is resorted to the consumption of mobile journalism which coincides with political consumerism, as the changes shift "from industrial to post-industrial economies" (Copeland, 2014a) and from materialist to non-material values. And it might be estimated that immaterial considerations are being added to materialist choices for news consumption, which is akin to political consumption (Copeland, 2014b) and seemingly inspires mobile journalists to be more public-spirited and issue-based(ibid.) At this point, mojo extends the connotation of online political expression to online politically expressive production of news, and shapes the overlapped roles of citizens, news producers and news users as citizen-prosumers whose news preferences entail predispositions, sociality and information seeking(Weaver et al., 2019; Gil de Zúñiga et al., 2014; Lee, 2015).

Thus, it is worth emphasizing that mojo production is one of the initiators for the association of news engagement and platformed-mediated political participation (e.g. Martin, 2016). As discussed ahead, civic orientation is intrinsic to mobile journalism. Mobile journalist is an active multimedia user and news-storyteller of user-generated content, user-generated stories and user-distributed content (Burum, 2016; Couldry, 2015; Villi et al., 2015). Taking advantage of mobile mediality, mobile journalists are incessant consumers and weavers of contexts (Couldry, 2015) and present themselves to the personal public (Schmidt, 2014), playing the role of citizen-prosumers with the aptitude for politically producing and consuming both hard news and soft news (Boukes et al., 2015). Conversely, these contexts render platform affordances for participatory practices upon which active mobile journalism depends (e.g. Couldry et al., 2010).

Nonetheless, there are missing links between news engagement and political participation due to the breach between interest (or motivation) and action, as suggested by Couldry et al. (2010). These missing links can be explained and reforged, in line with their views, by the contextualization of three ingredients: democracy, civic action in the mediated society and media literacy. Based upon the realization of contextualization, the connection through extant identifiability, biometric recognition and platformization of reality, everything in human society has the propensity to be connected (e.g. Beacon

platform) and the habitus tends to evolve into a virtual platform (e.g. the supermarket with face recognition and no checkout operator or self-service tills), whereupon data is not the only capitalist resource. Rather, mobility and flexibility might be the resource when the epic of platformization arrives. In part, new humanism (Pérez Tornero et al., 2010) would probably be one of the linchpins of post-platformization when the appeal for participants to keep engaging with the accustomed platforms is of great importance in consideration that journalism and politics interlace (Hanitzsch et al., 2016).

News consumption seems the threshold of political action (Couldry et al., 2010). Further, habitual engagement is related to news preference for media platforms and content, social capital, and political efficacy (Bachmann et al., 2013; Couldry et al., 2010). And in view of the realization of platform ecosystem(q.v. section 1.2), citizen-prosumers may be more likely to participate in political and civic activities in the platform-contextualized habitus, which "feeds into a virtuous circle" (Couldry et al., 2010). Therefore, the momentum to keep engaging[3] takes place in the mobile-digital situation, where personal context (Pérez Tornero et al., 2010) infused with highly idiosyncratic and diverse media repertoires (Molyneux, 2017) concurs with both latent and manifest forms of political participation (Ekman et al., 2012).

3.6. Conclusions

Predicated on literature research, we find that political participation is deposed to network and personalization under the integration of digital context, and concurs with activation and operation of mobile journalism. In the concurrence, mobile mediality is being shaped, sociality has the propensity for being platform-based, engagement momentum is theoretically possible.

Notes

1 "The more contacts you have and make, the more valuable you become."(Dijck, 2013) To put it another way, "the more numerous their users who use a platform, the more valuable that platform becomes for everyone else." (Srnicek, 2017)

2 Halfway between political activists and self-labeled "journalist", with a banner in one hand and a GoPro or mobile phone in the other, many participants of Yellow Vest movement present themselves blending journalism and activism.

3 The online survey(Vorderer et al., 2016) conducted with 178 university students in Germany finds that being permanently online(PO) and permanently connected (PC) occur frequently(e.g. cyberloafing, in waiting situations and being alone on public transportation), and are most likely a psychological readiness and alertness; and that "being connected to others (PC) seems to be more relevant to the participants than browsing the web(PO)".

Chapter 4
A Communication Paradigm

4.1. Emerging in communication field

To a certain degree, communication theories possess two main models. Regarding communication as a dialogical-dialectical field of "the constitutive model of communication as a metamodel and theory as metadiscursive practice" (Craig, 1999) and based upon the communicative reality when digital platforms were not as pervasive as nowadays, seven traditions are distinguished and sketched in the communication field (ibid.), i.e. rhetorical tradition, semiotic tradition, phenomenological tradition, cybernetic tradition, sociopsychological tradition, sociocultural tradition, and critical tradition. Even though some traditions can generate across theoretical and even transdisciplinary matrices, it is not yet to realize the schematization (e.g. communication models, see McQual and Windahl, 2013) of communication field, except scaffolding a scheme of commonplaces and stock arguments. By contrast, transmission model of communication generally views communication as a process of sending, receiving messages or transferring information from one mind to another (cf. Craig, 1999), while the information is being processed or reprocessed.

Paradigmatic examination and explanation of communication models is adopted as a way to schematization of communication field. For instance, media effect theory is the frontline of identifying the paradigm crisis (Kuhn, 2012) of media sociology paradigm (Gitlin, 1978; Lang, 2013; Chen, 2018). To model the media effect, theories develop from classical mass communication effects (e.g. hypodermic injection, two-step flow of communications) to limited effects model (Lang, 2013). This is a transition from taking the mass media social constructive ability as granted to the attention of personal influence (Gitlin, 1978). This is also a tendency to the paradigm "transferred into a person's memory and is made available to the person when they are undertaking an action" (Lang, 2013).

According to Kuhn (2012), a paradigm is legitimate as the possibility of puzzling-solving, and ought to be used in two different senses: (a) the constellation of beliefs, values and techniques which are shared by a given community structure; (b) the specific models or examples that can replace explicit rules for puzzle-solution. Combined both media effects theories, mediatization theory is emblematic of a new paradigm (Lunt et al., 2016). The mediatization paradigm is emerging since the organizational and institutional power of media increasingly exerts in and beyond media companies, organizations and institutions, so that media logic is also apparently effective in many other sectors, such as politics and culture, even the society as a whole (Mazzoleni and Schulz, 1999; Hjarvard, 2013; Stromback and Esser, 2014). Besides, in academic practice, the research communities and schools are evidently active (q.v. appendix A), and form a certain community structure.

Hence, it seems that mediatization is a valid paradigm in communication field. It strives to explain the puzzles it aims to solve. These puzzles normally relate to (1) the spread of media influencing on and intertwining with other fields or social institutions (Hjarvard, 2013); (2) the media-related dynamics of change play along with mechanisms that are socially and culturally contextualized and interactional (Driessens et al., 2017); (3) the evolution of the derivative concept--media logic or media logics (Thimm et al., 2018); (4) the deep mediatization dependent on digitalization, and personal and institutional automated data processing (Hepp, 2019); and among others. Following the enterprise of mediatization to solve these puzzles, it is argued that mediatization is characterized by a crucial feature: the media logic's detachment from society in order to either historically (Livingstone et al., 2014) or intersectionally (e.g. interactions and dynamics across sectors) concern the effects of the media on society. The duality and opposite of media and society may link the interaction between them by the dimension of time. But is it plausible or too general to explain a specific phenomenon? Or is it a kind of circularity? This is manifested in the paradox of mediatization as new paradigm of comprehending communication while incapable of discerning itself from the old paradigm of media sociology which assumes media (especially mass media) are external to society (Lang, 2013).

In this sense, Lang(2013) stands by another paradigm aiming to solve this paradox. As opposed to the media sociology paradigm that intrinsically conceptualizes communication (particularly mass communication) as an agent of change that is external to people (Lang, 2013), the paradigm in question assumes that the methods, tones, texts and critics of communication are humanistic and changing with cultures and environments. For instance, the puzzles of this paradigm involve how mass-mediated messages are processed differently from different forms of communication (ibid.), etc.

But neither paradigm seems outright convincing in terms of argumentation about the impetus of media influence[1] and the specific attribute of influencing approach[2] when media is increasingly automated. The theoretical constructs, e.g. the culture of connectivity (Dijck, 2013), mediated construction of reality (Couldry and Hepp, 2017) and platform society (Dijck et al., 2018), attempt to answer the paradox via integrating theories such as political economy, actor-network theory, communicative (re)figuration (Hepp et al., 2018; Hepp, 2019) and social construction tradition (Berger and Luckmann, 1966). But mixed theories are not explicitly described as the emerging paradigm that focuses more on individuals and/or a cohort of persons with respect of psychological and physical activities and interactions with media, upon which exerting network effect over the habitus[3].

Here need (1) an emerging paradigm that elevates the mediated platforms to the level of being able to be organizationally coalesced into both sociological institutionalization and personal formation and the free permeation between them, which is rendered through platform logic; (2) an incipient paradigm that recognizes power-transmission structure and affective information conveyed through symbolic generalization[4] of texts, pretexts and subtexts fashioned through platform architecture. We propose that the main theoretical components of *platformized*[5] *communication* are platform logic, platform architecture, and associate network automation which is the consequence of interlinkage of platform logic and platform architecture.

Aside from symbolic generalization, platformized communication registers some attributes of kinesis. Kinesis is not only a biological concept, but also refers to “moving”, “movement” or prewar “mobilization”(e.g. used by Thucydides). We extend the meaning (a)

to describe the actionable and real-time response of a communicative and information-processing system to the external stimulus and/or internal stimulus but not solely and directionally oriented toward the source of stimulation on account of autonomic network, and topologically it might resemble amorphous structure; (b) to postulate human emotion and behaviour (kinesics) as the metaphor that involves humanity as the agents (in certain circumstances as the victims) sharing cultural assumptions that emerge from the relations established between the natural, the human and the technological spheres (Clark et al., 2015).

4.2. Platform logic

The platformized communication paradigm is cast generally in line with platform logic which is imprinted in the practices and cultural modelling from mediated message[6] to mediated platform[7] that possesses mediated ability of processing information. Based on the arguments made thus far, platform functionality[8] (q.v. section 1.2), platform automation (q.v. section 1.2), mobile mediality[9] (q.v. section 3.3), platform-based sociality[10] (q.v. section 3.4) amount to the quaternions of platform logic.

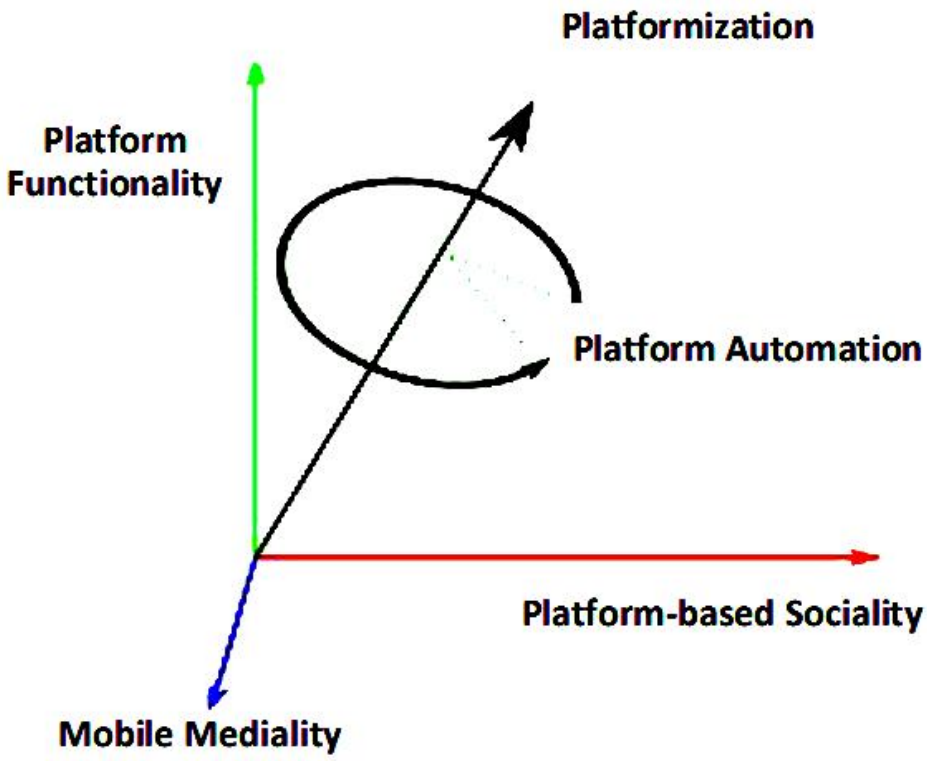

Figure 4.1 Quaternions of platform logic. Source: Own elaboration.

If platformization can be regarded as an axis, process and vector, platform automation[11] indicates the rotation angle that signifies the degree of automation and determines inherent dynamic of platformization in the quaternions. The transect of platformization in specific context would be the entanglement of platform functionality, mobile mediality and platform-based sociality, sharing proximity of media repertoire, media ensemble and media environment[12] as spacial, psychological and cultural dimensions.This inherence marks the difference towards perception of *media* between deep mediatization (Hepp, 2019) and platformization, since both examine automation by taking account of media influence. Compared to deep mediatization viewing media as a process

(ibid.) which not only confusticates the denotations of media and mediatization but also tends to alienate automaton from core theoretical and social constructions, platformization inspects media as mediated and dynamic platform that typifies interactivity[13] and data (or information), and the interactivity and data turn out to be resources that boost the vector of platformization particularly when network effects come about (q.v. section 1.2). During this process, resource production and management make profits (e.g. Srnicek, 2017) and add values[14] through automating in the strands (Karatzogianni et al., 2020) of commons, platform cooperativism[15], sharing economy, etc. During the same process, platformization is primed for actions and at least provides avenues and possibilities for the permeation between collective and connective actions (Bennett and Segerberg, 2013). Taking the correlation of mobile journalism and political participation (q.v. chapter 3) as the instance, UGC and UGP are the data for platform logic, and the engagement momentum (q.v. section 3.5.2) is an avatar of connectivity (see figure 4.2).

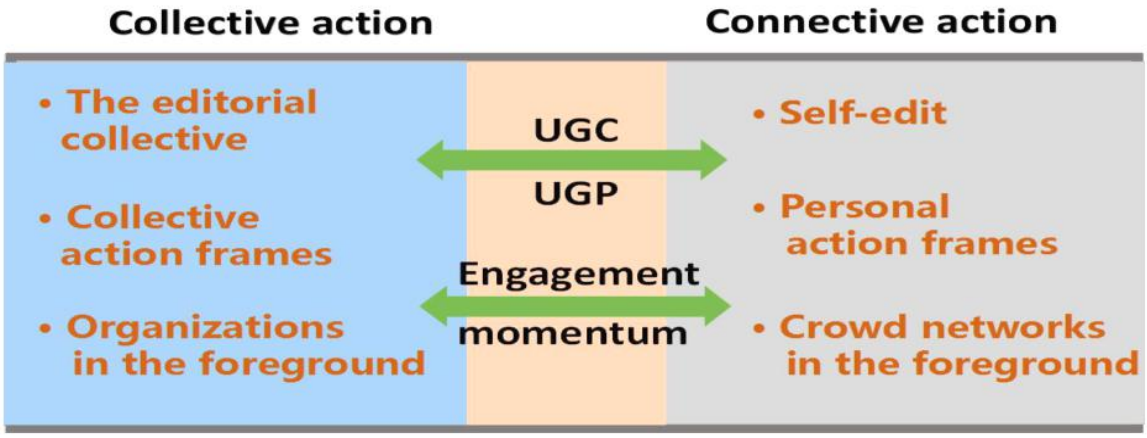

Figure 4.2 Permeation between collective and connective actions. Source: Own elaboration.

Platform logic aims to model communication from a novel and systematic angle, and more importantly to offer a new analytic tool for the dyad of politics and platforms, owing to the embodiment of integrative approach and horizon of three meta-discourses[16] of modelling communication (Bergman et al., 2019). Thus practically, it is necessary to identify the intertwined courses of realizing platform logic, i.e. personalization and convergence, given that both truss up the quaternions. Personalization at issue is generally an identification from others, according to maltifarious platforms, contents, and platform users. In specific, it is the manner by which platforms and contents (q.v. sections 6.3.2&10.2) are tailored to users´ demographics, political and cultural standpoints, consuming patterns and conventions, physical and virtual environments, psychological movements, device attributes, etc. As regards convergence[17] (e.g. Xiangzhong, 2020), it has four meanings, i.e. (1) technological combination (VR/AR+4K/8K+5G/6G+AI), (2) organizational/institutional integration (capital, personnel, policy, working routines), (3) information assimilation (PGC[18]+UGC/UGP+AI Generated Content), (4) omnipresent participation[19] (various participatory methods).

This model we proposed inspects the technical, personal, institutional and societal rationality, and attempts to expose the rationale and procedures which platforms follow to intervene private and public sphere. This model differs from the one proposed by Schwarz (2017) which examines platform logic as the way and dominance of platforms and platform corporations influencing across micro, meso and macro levels (see figure 4.3). We contend that the model of platform logic should not only reflect platformization´s scheme of transcending layered structures and social and commercial strata, but also of penetrating[20] (Nieborg et al., 2018) micro, meso and macro levels and the ternary opposition, which is another key difference from deep mediatization[21] (Hepp, 2019).

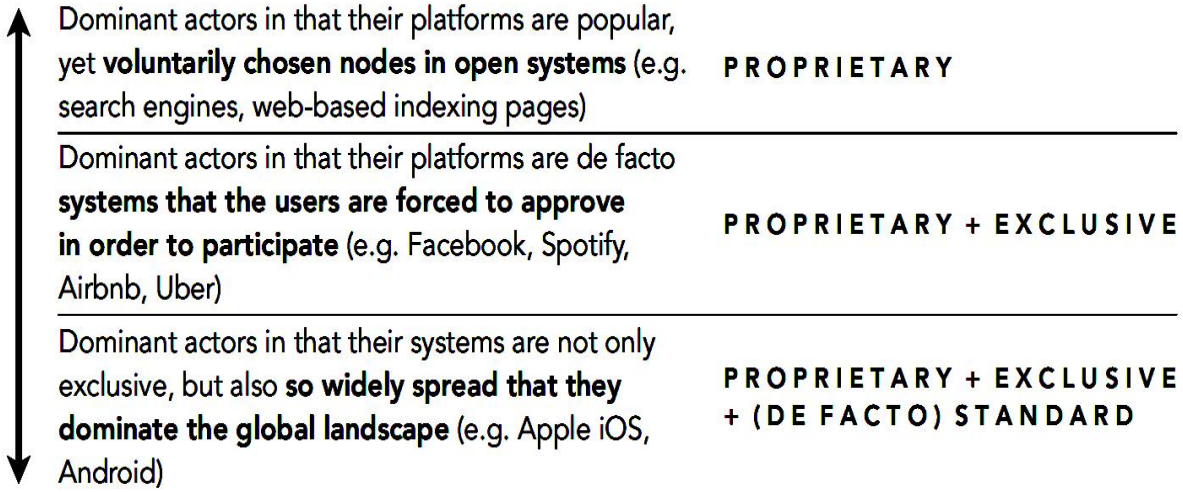

Figure 4.3 The rationale of Schwarz´s platform logic model. Reprinted from "Platform Logic: An Interdisciplinary Approach to the Platform-Based Economy," by Schwarz, J. A., 2017, *Policy and Internet*, 9(4), p. 378.

4.3. Platform architecture

Platform is an architectonic composition in the territories of computation and algorithm[22], building and space, politics and discourse (Gillespie, 2010; Papakyriakopoulos et al., 2020). As for digital platforms, their functionalities are usually endogenously represented through specific software, firmware or hardware architectures. And exogenously, platform ecosystem is dynamic, on account of data supply and network effects (q.v. chapter 1). Platformized communication is cast to some extent in the form of platform architecture that constitutes the structure and vitality of certain communication activities; and organizes and/or institutes the platform entities[23]. Put differently, platform architecture has two senses, first, internal structure[24], i.e. engineering structure of software and/or hardware; second, external/network structure, i.e. platform's structural position and organizing in platform ecosystem in terms of infrastructures and institutions.

Either of the structures is not only a structural appropriation of resources, but also a concatenation of coded sociality in a specific cultural, economic and political context and an exhibition and exertion of power that moves beyond discursive range[25] and "toward a more heterogeneous ensemble which includes the non-discursive" (Coté, 2014), inasmuch as information transmission is understood in a kind of manifestation of platform-created space[26], and also understood as a kind of time recording[27] that is carved through the casted platformized communication. Restricting the scope to the coding theory (Neubauer et al., 2007) for information transmission, platform architecture should be in support of reliable transmission of information over noise channels. Communication in this sense can be comprehended as transmission over specific real and virtual space, e.g. radio channels and optical wavelength, and as transmission in the dimension of time by storing information in appropriate storage media.

Jensen and Helles (2017) hold the dissevered, fixed and static topology of communication which treats technologies and services as the scale of time and social structuration (ibid.). Although they have realized this exceeded certainty may lead to the unaccountability of the automation of communication to a certain degree, and propose the many-to-one communication as the rationalization and reclamation, it is not sufficient to only inspect the operational analysis of interface (Rubin et al., 1985) between different prototypes of communication, and not adequate to figure the prefiguring of certain kind of platform users' information.

With platform ecosystem being dynamic and a coherent whole (q.v. section 1.2), external structure ideally could be amorphous with regard to communication prototypes, and is able to accommodate itself to different contexts. Morphologically, it seems to bear a resemblance to contagious communication (To¨rnberg, 2018). For instance, it is not always in the form of strict many-to-one, many-to-many, one-to-many or one-to-one. The external structure can also be represented by the interaction of both contents and forms[28], by the interaction that transcends the duality between distributors and distributees, such as one-to-one-to-many (see figure 4.4), which is another reason of apprehending the architecture from the systematic perspective of platform ecosystem that tends to be gaining

omnipresence of communication architectures[29]. However, it does not deny the legitimacy of certain architectures including network topology, apparatuses and institutions (Heinrich, 2012), and it is upon the mediated construction of society (Couldry et al., 2017) in general and the gratification of platform participants and users (Rubin et al., 1985) in specific.

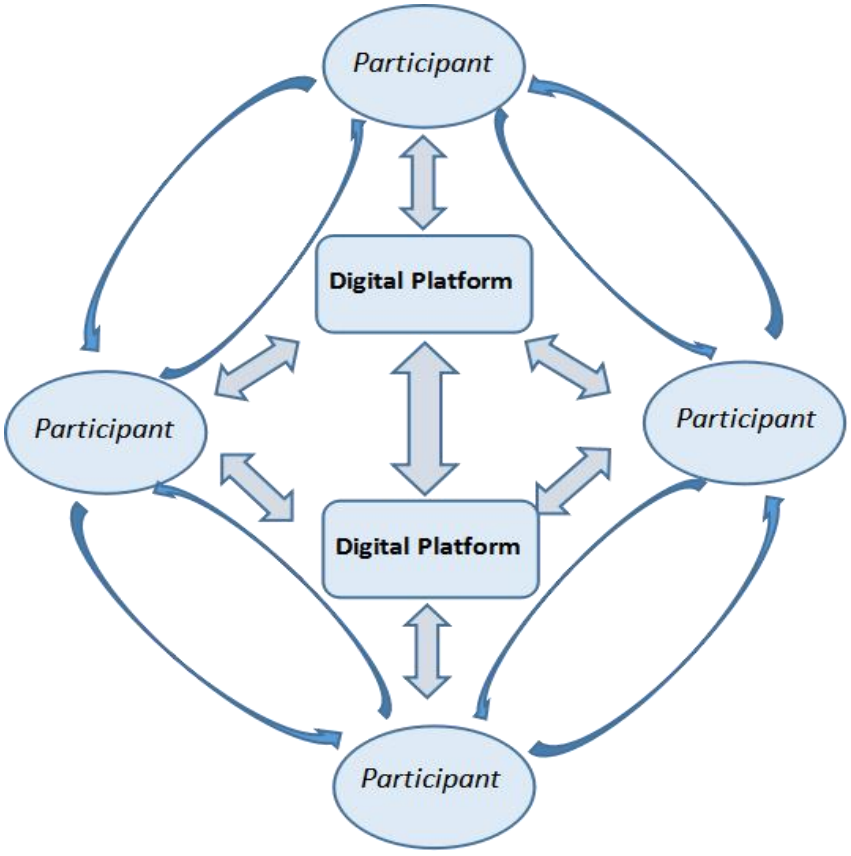

Figure 4.4 Flow of information between digital platforms and participants. Source: Own elaboration

This structural dynamic yields structural virality that generates dynamics, direction of information distribution, and even generates information[30] per se at high granularity and sensitivity[31] of time intervals in comprehensive media environment of high level of virality of online and platform influencer with Multi-Channel Network (MCN) and Intellectual Property (IP) products and services, on account of (1) hyperactive users (Papakyriakopoulos et al., 2020), (2) technology-supported communication infrastructure[32] and services (Bots[33], 5G, IoT, Cloud, Deep Learning Service etc.), and (3) network typology which under ideal conditions frames communities at least discursively[34], boosts user participation and clears the technological, institutional and political barriers for communication expediency and the culture of political discourse (Hepp et al., 2016). Normally in a narrow sense of external structure, network typology has dendrite structure, linear/circular structure (Martin et al., 2019), lattice structure and small-word structure (Ch'ng, 2015). In the practical sense, the usual network typology tends to over-simplify the structure while taking perspectives of transmission conduits (see figure 4.5) and multi-layer of information processing (see figure 4.6).

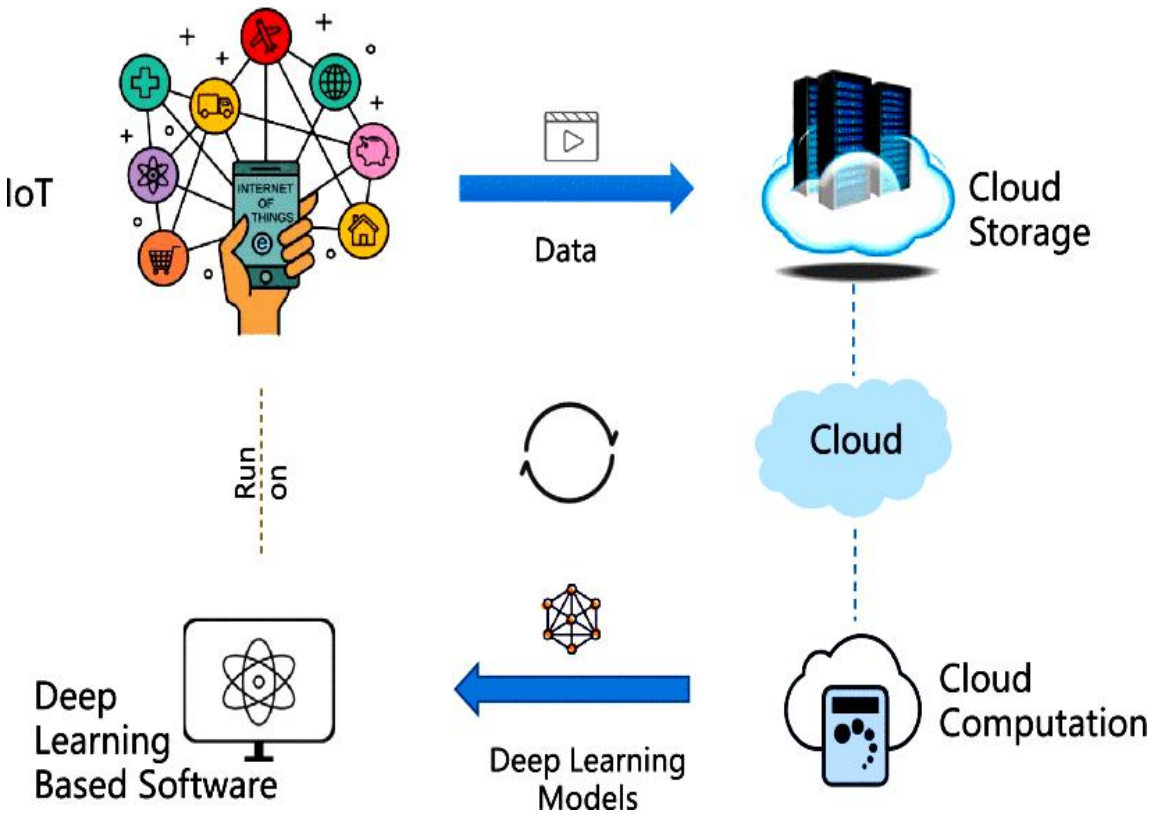

Figure 4.5 Linear and circular architecture of information transmission with IoT, Cloud, Deep Learning. Reprinted from "Toward knowledge as a service over networks: A deep learning model communication paradigm," by Chen, Z., Duan, L., Wang, S et al., 2019, *IEEE Journal on Selected Areas in Communications,* 37(6), p. 1349.

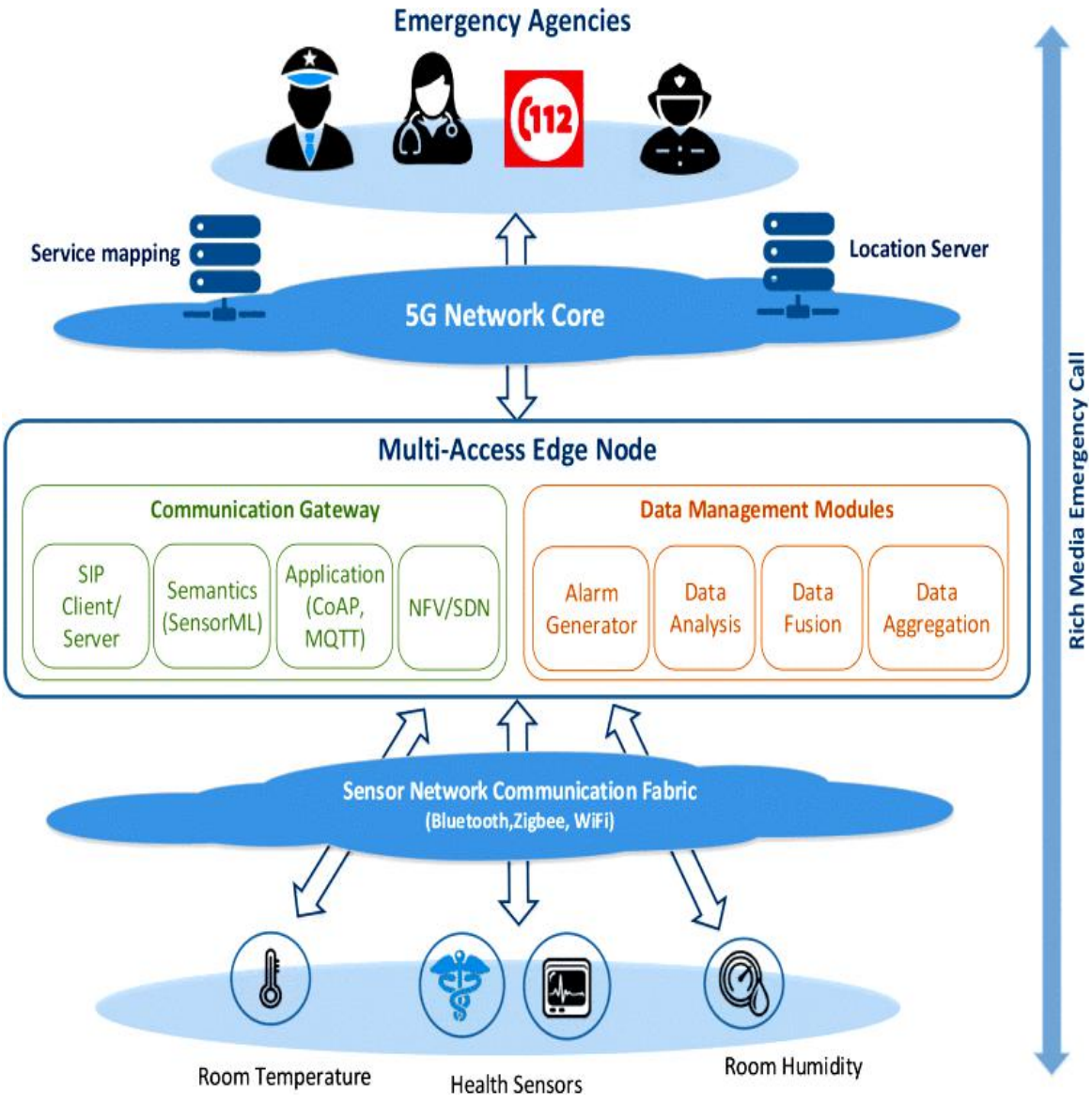

Figure 4.6 5G-inspired communication service architecture for emergency. Reprinted from "On measuring the efficiency of next generation emergency communications: The EMYNOS paradigm," by Politis, I., Lykourgiotis, A., Tselios, C., & Orfanoudakis, T., 2018, *IEEE International Conference on Communications (ICC)*.

As the experiment conducted by Ch'ng (2015), the instantaneity of events, connections within limited Twitter interface can result in the network structure that acquires a direct relationship with active users and clusters. As news sharing business struggles to control over meaning construction (Couldry et al., 2017; Martin et al., 2019), communicative network is supposed to respond by some kind of spontaneity and autonomy in social news sharing ecosystem (Martin et al., 2019) of being diverse and pluralistic, deep fake and post-truth, computational propaganda (Woolley et al., 2019) and hate speech.

Further, has the network structure assumed automating ability and flexibility to a degree? It is possible as there exist social media automation tools in market, and more importantly autonomic design[35] of network (see figure 4.7). News stories are propagated via networks by users or the public, through users' pursuing of entertainment and self-interest, malice and dissatisfaction, in form of platform-based sociality, e.g. link sharing, endorsing or commenting (Chorley et al., 2016; Martin et al., 2019). From this point of view, the automation of network structure is reasonable since it is to gratify users' needs[36], the materialization of social practices (Couldry and Hepp, 2017), the influences of media materiality (Hepp, 2019) and big social data materiality (Coté, 2014).

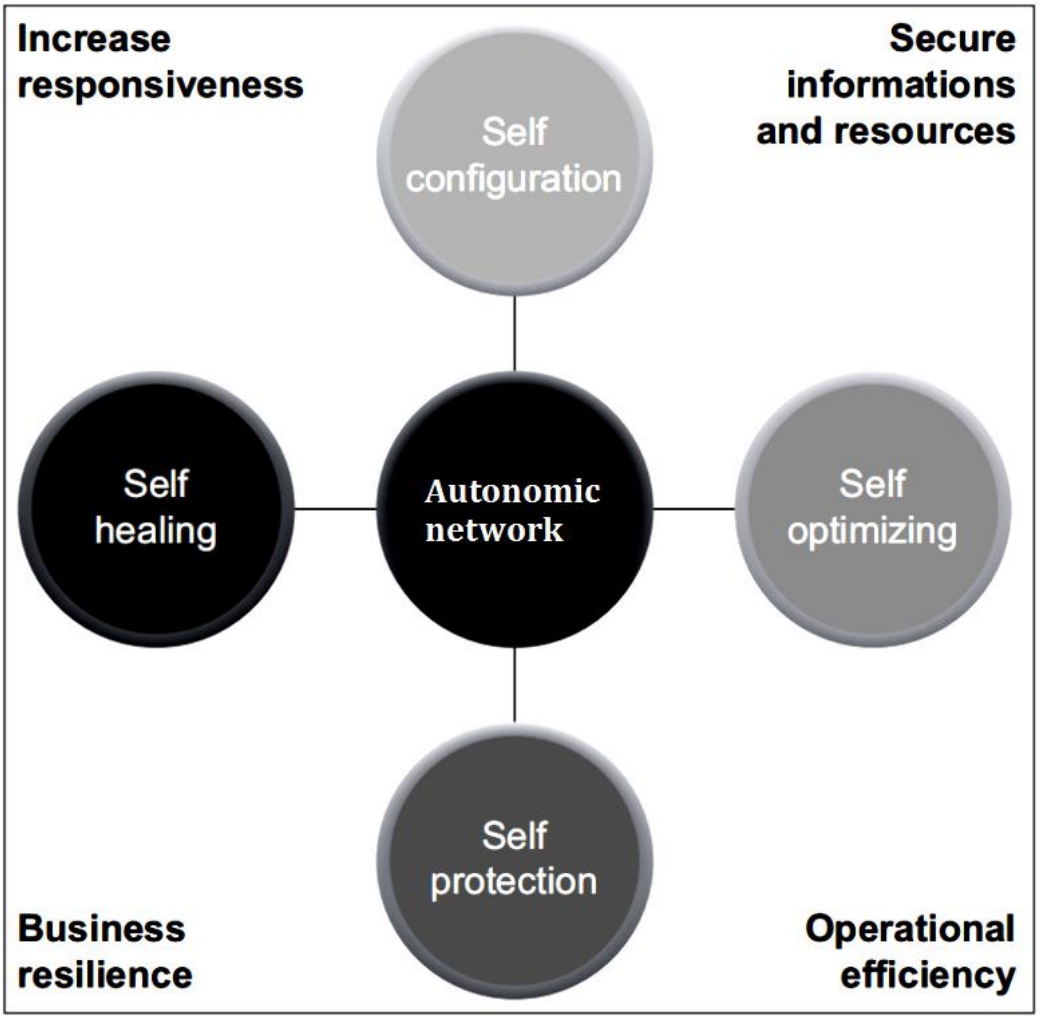

Figure 4.7 Autonomic network design. Adapted from *Autonomic Network Management Principles: From concepts to applications* (p. 7), by Agoulmine, N., 2011, Academic Press, Elsevier Inc.

4.4. Political platformization

Jumping out of classical mediatization paradigm offers new angles to dissect communication panorama with the advantage of theoretically validating the paradigm crisis and the impulsive power of media influences on media organization and media-related companies and the effect on different sectors beyond media and information, such as education, business, governance and political campaign. Premised upon the logical starting point that media play as dynamic platforms in platformized communication, political communication is influenced and being re-figured[37] by platform logic and platform architecture in political discourses and practices, by means of extension, substitution, amalgamation (or hybridization), accommodation (Schulz, 2004), which process we call political platformization. Specifically, platform automation explains the technically(Capobianco, 2019), socially and politically automating social network and generates the spill-over effects[38] on the elaboration likelihood (Petty and Cacioppo, 1981), on the strength of general acceptance of appified culture (Morris and Murray, 2018). For instance, the surgical precision of AI-driven targeted and automated mass news distribution via social media tends to be propitious for engagement and be beneficial for a particular news campaign (Sabatovych, 2019). On this wise, there is much potential of increasing the power of political communication, in practical sense, with the full exploration and application of platform functionality, mediality, sociality, structural virality, etc.

Nevertheless, this is entangled with tensions (e.g Happer et al., 2019) between different digital platforms, and their relations with legacy media, digital native media and public sphere, and new angles of inspecting this entanglement emerge. In some cases, news sharing is a dynamic process and a result of wrestling that involves "bottom-up audience participation and sharing, and top-down, professionally constructed interventions across media platforms." (Martin et al., 2019) In the negotiations about velocity, veracity, authority and trust, platform-based sociality and mobile mediality are not deemed to bring "unalloyed public benefit". (ibid.)

Is the autonomy endowment[39] between platform participants and platforms (specifically platform external structure) a zero-sum game? The entanglement of the

quaternions at least embroils the situation where the second media age (Poster, 1995) and the third media age[40] (Li, 2020) are also entangled, which is, to put it another way, on the cusp of middle age between them. Mobile mediality for instance has the potential of transferring rights to the architecture and activating some repercussions[41]. Resonating with the outwardly unceasing power from data (Coté, 2014) or more politically and epistemologically *infopower* (Koopman, 2019), platform-based sociality is affected by estrangement and self-alienation (Marx, 2007) in platform capitalism (Srnicek, 2017) that might consciously or unintentionally unfetter the decay of truth[42] and has not precluded historical production of informational persons (Koopman, 2019) in the seemingly technological panopticon where participants' labour and data are plundered and moderated[43] by surveillance capitalism (Zuboff, 2019) struggling to masquerade and downplay their roles as mere conduits and intermediaries[44] through customizing and deepening platform functionality and platform automation[45], when institutional elaboration and significant expansion challenge market's tentative promise of inversion and its advocacy-oriented values(Zuboff, 2019).

According to Koopman (2019), infopower has at least four constituent categories: technique, operation, subject (or power's targets) and rationality, which reverberates with other forms of political powers. Whereas, infopower is uniquely irreducible compared to sovereign power, bio power, disciplinary power, while layered on them and exerting sovereignty of data, excising control, shaping expository construction (ibid.). Following this logic, as other forms of powers it is grafted on, infopower if run in surveillance capitalism appears to not meet the idealist promise for emancipation. Moreover, it might lead to radical indifference[46] (Zuboff, 2019) that platforms shed on users, and leaves barely leeway to their employees for organic reciprocity (ibid.). Therein lies logic of resistance composed of objection sentiments and activism.

Firstly, platforms normally benefit from content monitoring but escape tort liability. Section 230 of the Communications Decency Act[47] deems that platforms should offer "a forum for a true diversity of political discourse, unique opportunities for cultural development, and myriad avenues for intellectual activity". But in reality, the organization

named National Whistleblower Center[48] alleges Facebook of misleading shareholders about its efforts and abilities of dealing with terror and hate content, live-streamed murders and suicides, wildlife trafficking, and the sale of stolen antiquities[49] on platforms, and in an extreme case[50] accuses Facebook of algorithmic generating terror content, instead of effectively weeding out violent posts automatically through artificial intelligence.

Secondly, the ability of information affordance and control occurs with the reality of bias and misinformation[51]. According to a Pew report[52], although news accessing from social platforms is relatively common experience, the majority of platform consumers surveyed are concerned about social media companies´ excessive control over the news people see, and these companies' efforts resulting in a worse mix of news. And about eight-in-ten platform consumers say that social medias treat some news organizations differently than others, and favoring ones with sensational content, more social media followers and partisan coverage. And they think the platforms lean more liberal than conservative.

Thirdly, profiting as the scalable and vibrant discourse forum and the deplatforming for certain ideologies. To put it another way, the contradiction of capital logic and public attributes, and the crucial mediated power -- political logic[53].The founding values of such platforms are normally for commercial or private interests[54], while the expectation of such platforms are public sphere or at least meso news-space(Tenenboim et al., 2020). The overlapping of these two values seems to incite resistance cases[55].

4.5. Conclusions

In light of discussions of above chapters and in contrast to mediatization theory, we propose to construct a communicative paradigm that could better explain the phenomenon that platforms and platformization make the difference in communicative activities and political communication or participation specifically.

In this paradigm, platformized communication is extant by virtue of platform logic, platform architecture, and associate network automation. Platform logic primarily refers to

platform functionality, platform automation, mobile mediality, platform-based sociality and the quaternions they constitute. Platform architecture casts platformized communication as the amorphous interaction. In terms of this paradigm on political communication, we suppose that it is necessary to put forward the term -- political platformization to decipher the influence of infopower from platforms on political practices.

Notes

1 For instance, the paradigm legitimacy lies upon the inherent and diachronic development by some scholars (Livingstone et al., 2014; Lunt et al., 2016), which is less convincing because it is subjective to circular logic to encompass the impetus of media influence, unless with recourse to alien impact factors as capital, political culture, etc.

2 As an evidence, following the dominant paradigms, the hybridization theory of AI and human communicators, for instance in domain of interaction between intelligent machines and news routines, might be an avatar of amalgamation approach. Considering all four approaches-- extension, substitution, amalgamation and accommodation-- distinguished by Schulz (2004), hybridization theory seemingly needs a wider theoretic horizon.

3 Introducing Bourdieu's concept -- habitus. See Grenfell (2008).

4 Derived and extended from what Kuhn (2012) defined, the point is that meaning generation and human conduct formation proceed through symbolic interactions (see symbolic interactionism, Blumer, 1969).

5 "Platformized" not "platform", since the demarcation from other communication theories where platforms normally also perform in diverse forms and methods, whereas not in the sense discussed in this study.

6 Upon mediated information, mediatization takes place. In the more concrete sense, Depp (2019) refers to the notion as mediated involvement in different communities.

7 When platform reflects media attributes.

8 Pertaining to platform functionality and platform participation discussed before in this study, platform functionality closely involves platform user participation, including producing, active consuming, forwarding, commenting and discussion, etc.

9 "Mobile interactions with social networks." (Humphreys, 2012)

10 On the base of platforms, the sociality that foregrounds digital platform literacy and new humanism (Pérez Tornero and Varis, 2010).

11 Although simply data-driven, it might have overtones of social capital, industrial and financial capitals, revenues and politics.

12 Hepp (2019) distinguishes three manifolds of media in the scale of individuals, social domains and society, following the usual discussion angle of measurement: micro, meso and macro.

13 Interactivity can be generalized in various settings, such as duality of audiences and journalists, mobile journalists and traditional journalists, AI and human intelligence, TV programs and Youtube content, and in general any duality of actors or actants

14 Sometimes including social values, business value, capital value, public and political values, news values.

15 "Solidarity, mutual support, openness, to include new people and influence them to be consensual, participative, and so there are many user circles connected to movements." (Karatzogianni and Matthews, 2020)

16 That is, transmission model (information conduits), interactional and transactional model (social interaction), ritual/constitutive model (social construction).

17 There is overlapped area with media hybridization theory.

18 In the expression "Professional Generated Content", "professional" is difficult to define since the various contexts and practices in journalism and communication, particularly with mobile/citizen journalism. Thus, its boundary of denotation is comparatively flexible.

19 This is based on that sociality can be always present due to technologies, such as holography, VR, Internet of Things.

20 The examination of platform logic from the intersectional angle that many intersections of specificity of platform ecosystem assemble consecutive frames.

21 Deep mediatization underscores the re-figuration power and recursive process across different levels, which we admit is also applicable in platformization.

22 Algorithms are not limited to mathematics and software development. More importantly as steps of information processing, they are a set of mental codes and lay-out of steps that people use and follow to make sense of media messages both consciously and unconsciously (Potter, 2012).

23 Corporates, media, administration, NGOs, etc.

24 Such as Monolithic Application, Service-Oriented Architecture, Miroservices for software development.

25 Coté (2014) introduces Foucault's concept "dispositif " to big social data analysis and proposes "data motility" to interpret the autonomy and power of confinement through computational cloud architecture and cognitive capitalism (Boutang, 2011). While, the same power offers polyvalence of sociality and economy.

26 For instance, Twitter sphere and commentary section of a platform.

27 As the mark of existance and growing (Eichhorn, 2019), more so with blockchain technology.

28 See the discussions about “interaction form” of mediatization in Hepp(2019).

29 Li (2020) calls this ¨ubiquitous mass¨.

30 Although the right of being forgotten is listed in General Data Protection Regulation and others, if living in a dynamic architecture, the effort to delete certain data theoretically generates some data to manage the pressure to share and digital footprints (Eichhorn, 2019), even more so with blockchain technology deployed.

31 Instead of relative anonymity and impersonality in mass communication.

32 Three levels: geo-ethnic media, community organization, local residents (An and Mendiola-Smith, 2018).

33 Many of the links shared on Twitter come from automated accounts, or bots. The Pew Research Center’s 2017 examination of tweets (not just those from U.S. adults) found that 66% of links to popular websites came from accounts that are likely bots. The share was even higher for several kinds of links, including those that led to adult content (90%) and sports content (76%). See https://www.pewresearch.org/internet/2018/04/09/bots-in-the-twittersphere/

34 “[T]he discursive links between residents, community groups, and local media, who are all involved in sharing stories about their community,” (Wenzel et al., 2020) stand for networks that is analogous to a certain imagined community (Anderson, 1991). And “when storytelling actors—residents, community organizations, and local journalists—are more connected to each other, communities tend to have higher levels of civic engagement and community belonging.” (Wenzel et al., 2020)

35 Including Living Systems Inspired Design, Policy-Based Design, Context Awareness Design, Self-similarity Design Principle, Adaptive Design. For more see Agoulmine (2011).

36 A key idea of uses and gratifications theory is that the individual difference intervenes between media and media effects (Rosengren, 1974; Potter, 2012), which is congruent with personalization in platformized communication.

37 Draw the concept from Deep Mediatization (Hepp, 2019) theory which defines “re-figuration as a circle of recursive transformation” at different levels and across their interrelatedness.

38 From online to offline; from media contact to political contact.

39 We accept that there are different and seemingly reasonable narratives about this endowment in surveillance capitalism, platform capitalism, cognitive capitalism or neo-liberal data capitalism.

40 Although it is a crucial profile of this age, it seems less plausible for immersive communication (Li, 2020) as the sole represent of third media age, partly because of

lacking explanation of automation and functional foundation of personalization. But it also seems to be assured that, for any media age, it is the technology development and the corresponding institutionalization that play important part.

41 Reflected in the communication during the activism, such as Yellow Vest Protests, 2019 Hong Kang Protests, 2019 Catalonia Protests.

42 Kavanagh and Rich (2018) define "Truth Decay as a set of four related trends:

(1) increasing disagreement about facts and analytical interpretations of facts and data
(2) a blurring of the line between opinion and fact
(3) the increasing relative volume, and resulting influence, of opinion and personal experience over fact
(4) declining trust in formerly respected sources of factual information."

43 Especially when particular action comes to normal, for example the automation taken in the Covid-19 crisis to monitor digital platform contents. https://www.protocol.com/ai-moderation-facebook-twitter-youtube

44 Endorsed by Section 230 of the Communications Decency Act that writes ¨No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider¨. See https://www.law.cornell.edu/uscode/text/47/230

45 Reflected in the endeavours of differentiating (Hepp, 2019) the functionalities and applying Blockchain (e.g. Qayyum et al., 2019), Fact-checking Platforms (Vizoso, Vázquez-Herrero, 2019), Decentralized News Network (https://dnn.media/), "Civil" business and organization model (https://civil.co/storyfeed), etc., so as to mitigate the negative effects.

46 The notion is rooted in the condition that influential platform companies predigest the platform-based sociality to simply automated connectivity (Dijck, 2013). Take Facebook as an example, see Ryan Mac, Charlie Warzel, and Alex Kantrowitz, "Growth at Any Cost: Top Facebook Executive Defended Data Collection in 2016 Memo—and Warned That Facebook Could Get People Killed," Buzzfeed, March 29, 2018, https://www.buzzfeed.com/ryanmac/growth-at-any-cost-top-facebook-executive-defended-data?utm_term=.stWyyGQnb#.cnkEEaN0v.

47 https://www.law.cornell.edu/uscode/text/47/230

48 According to its website, it is called to be dedicated to protecting and rewarding whistleblowers, provide legal assistance to whistleblowers, advocate for stronger whistleblower protection laws, and educate the public about whistleblowers' critical role in protecting democracy and the rule of law. See https://www.whistleblowers.org/about-us/

49 https://www.whistleblowers.org/hold-social-media-companies-accountable/

50 See May 9,2019, AP news report *Facebook auto-generates videos celebrating extremist images* https://apnews.com/f97c24dab4f34bd0b48b36f2988952a4 .

51 Notwithstanding the efforts claimed by platform company, e.g. based on trusted source, collaborative process of tacking fake news, building fact-checking network.
https://about.fb.com/news/2018/01/trusted-sources/
https://about.fb.com/news/2019/04/tackling-more-false-news-more-quickly/
https://about.fb.com/news/2020/04/covid-19-misinfo-update/

52
https://www.journalism.org/2019/10/02/americans-are-wary-of-the-role-social-media-sites-play-in-delivering-the-news/

53 For instance, Facebook's cryptocurrency is hindered by political power. Another case, U.S. Chief Technology Officer Michael Kratsios convened representatives from a number of tech's biggest companies and helped to push Facebook, Google, LinkedIn, Microsoft, reddit, Twitter and YouTube to issue a joint statement on fighting misinformation about COVID-19.

54 For public communication, the digital platform founded, for instance, by governments to substitute administrative activities in person.

55 For instance, the backlash against Facebook and Twitter deleting lots of users's accounts that denounce 2019 Hong Kong Protest.

Chapter 5
TV News Platform Analysis

5.1. Decoding TV news platforms

Stemming from the notions that platforms as dynamic media in platformization theory, and media logic and political logic as counterparts in mediatiazation theory, one aspect of platformization is the idea that news media are adopting and adapting to platform logic and platform architecture. It is hence essential to understand the relation of platform logic and political logic. With regard to TV news media particularly, are there distinctions of diverse TV news media embracing platformization, especially platform logic, in different political systems, government apparatus, with ideologies for different political aims and interests? Premised on the role news platforms play as political communication channels and the trade-off of entanglement (Magin et al., 2019; Karidi, 2017; Haßler et al., 2014; Evans et al., 2016) between commercial logic, media logic, political logic, and news logic[1], it seems arbitrary to purify the strain as the relation between platforms and certain logic, but this is a contributive reflection upon the competition (e.g. Nip et al., 2018) for discursive institutionalization and infrastructure dominance (Plantin et al., 2019) in different government systems, electoral campaigns (e.g. Trump TV[2]) and party systems (Dowding et al. 2001).

According to the Jigsaw Research report on news consumption[3] in the UK: 2019, among various news outputs, TV is the most common platform for accessing both international and local news, but the mainstream channels of TV news (such as BBC One, BBC News Channel and BBC Two) are less used by adults for news compared to 2018, while several social media platforms (such as Twitter, WhatsApp, Instagram and Snapchat) more used for their news consumption, and Facebook ranks third of the most-used news sources following BBC One and ITV. As to news trustworthiness, TV news are perceived to be one of the most truthful news sources by 12-15 year olds, and news from social media is

the least truthful. Moreover, news organizations are more likely to be the news source among social media news users, compared to sources from friends and family. And the Pew Research Center's survey[4], conducted July 30-Aug. 12, 2018, among 3,425 U.S. adults who are members of the Center's nationally representative American Trends Panel, also corroborates that news watching is the most preferred way of getting news and predominantly through TV (local, network or cable channels), compared to reading and listening, while slightly more news watchers choose websites, apps or social media as their news platforms. Thus, it is essential for TV news organizations to deeply embrace platform logic and platform architecture, in consideration of retaining the advantages as comparatively trusted and high-quality news media and taking advantage of social media platform's bandwagon effect.

However, this might lead to the confusion about what TV news platforms are to be decoded, such as Cable TV, IPTV, Web TV (Eriksson et al., 2018), Stream Media, Social TV (Proulx et al., 2012), IGTV (standalone video application by Instagram), Webcast Media. The television tends to evolve into multi-platform and multimedia equipment. The boundary between TV and other platforms that can play TV programs is increasingly indistinct, although TV news is traditionally conceived of disseminating current affairs and topical events via the electronic device of television. Nevertheless, TV news mostly has its websites and software applications for portable devices. With the broad spectrum of TV websites and apps, every screen has the potential to be a TV screen. Watching TV news can not only happens at a fixed space, but also on-the-go. The content of TV news varies with different platforms, and additional services can be offered online. TV news in the digital scenario might refer to the news produced within the television broadcast system, which can be watched not only via televisions but also such devices as desktop computers, laptops, tablets, mobile phones, and any other combinations of software and hardware to access and play videos.

In congruence with audience-centered approach of platformization theory (q.v. section 3.5.1), Edgerly and Vraga (2020) contend that what matters in defining "news-ness"[5] is audience perception of headline story type, facts versus opinion, intent to verify, and

information source and its relevance to respondents' partisanship, regardless of digital-native media, legacy media, partisan media, entertainment media or political political propaganda media. But we acknowledge that journalistic norms of accuracy, transparency and impartiality, which serve the journalism goals of informing and engaging the public, form a foundation of professional news and legitimize journalism as a truth-telling discipline, differing from other professional communication practices such as advertising and propaganda, political communication and political marketing.

To better understand the platformized communication principles that are instrumental in accessing, analyzing, evaluating, criticizing, and more importantly, creatively producing and politically participating digital platforms by which the content is conveyed, the cases of CGTN News6 and CNN News7 are examined following the platform analysis method of decoding TV news platforms via six parameters: platform ensemble, platform functionality, mobile mediality (e.g. mediated actions), platform-based sociality (e.g. gamification), platform automation, content module. We examined platform ensemble, platform functionality, mobile mediality, platform-based sociality and platform automation on May 11, 2020, and investigated content module on June 25, 2020.

5.2. Case analysis

5.2.1. CGTN

Platform ensemble of CGTN: Website, APP, Facebook, Twitter, YouTube, Instagram, TouTiao, Google+, Weibo, Dou Yin, Wechat, Pinterest, Tumblr, Miaopai, Quora, Linkedin, CCTV+, etc.

Table 5.1 Platform analysis of CGTN. Source: Own elaboration.

	Platform Functionality	Mobile Mediality	Platform-based Sociality	Platform Automation	Content Module
Website	Data visualization, Augmented reality, Virtual reality & 360° video, Free live content, Animation, Trending stories, Recommendations, Multi-language, Documentary, Video search and archive, Translator, documentary	5G immersive experience, Mobile version, News sharing, Newsletter	Gamification, Questionnaire	N/A	Top news, Breaking news, Opinions, Editors' pick, Most read, Most shared, Live now, Go mobile (mobile device friendly version), Global stringer, In focus, In depth, Features, In case you may like, Clustered by topics, etc.
APP (Android Version 5.7.3)	TV Live(multi-channel, multi-language), Customization, Translator, Specials, Trending stories, etc.	News sharing	Questionnaire News quiz	News Chatbot(*ask panda*)	Top news, Specials, My news, TV channel live, Live and replay of multimedia content(text, video and image), clustered by topics, etc.
YouTube	Channel ensemble (CGTN, CGTN Live, CGTN America, CGTN Africa, Faces Of Africa, CGTN en Español, CGTN Europe, CCTV Video News Agency, CGTN Arabic, CGTN на русском), Free live webcast	YouTube provides	YouTube provides	YouTube provides	Mainly clustered by topics and news programs, Following YouTube's module structure
Facebook	Channel ensemble, Fake news detection section	Facebook provides	Facebook provides	Facebook provides	Following Facebook's module structure

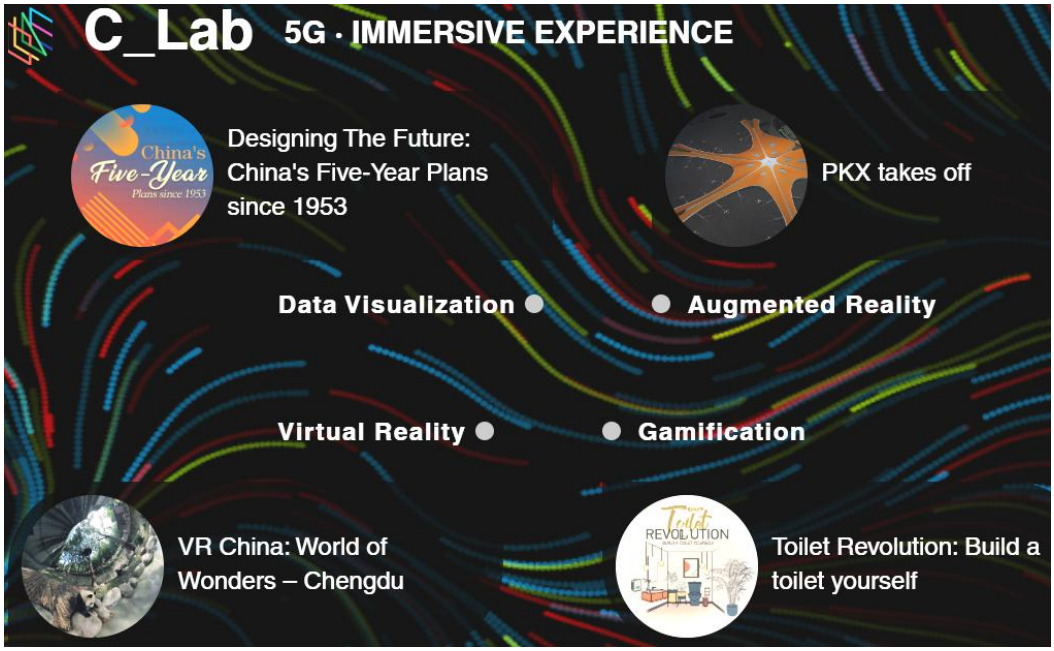

Figure 5.1 The interactive module of CGTN news website to access the content through 5G, data visualization, augmented reality, virtual reality and gamification. Retrieved June 21, 2020, from https://news.cgtn.com/event/2020/Designing-The-Future/index.html#page-6

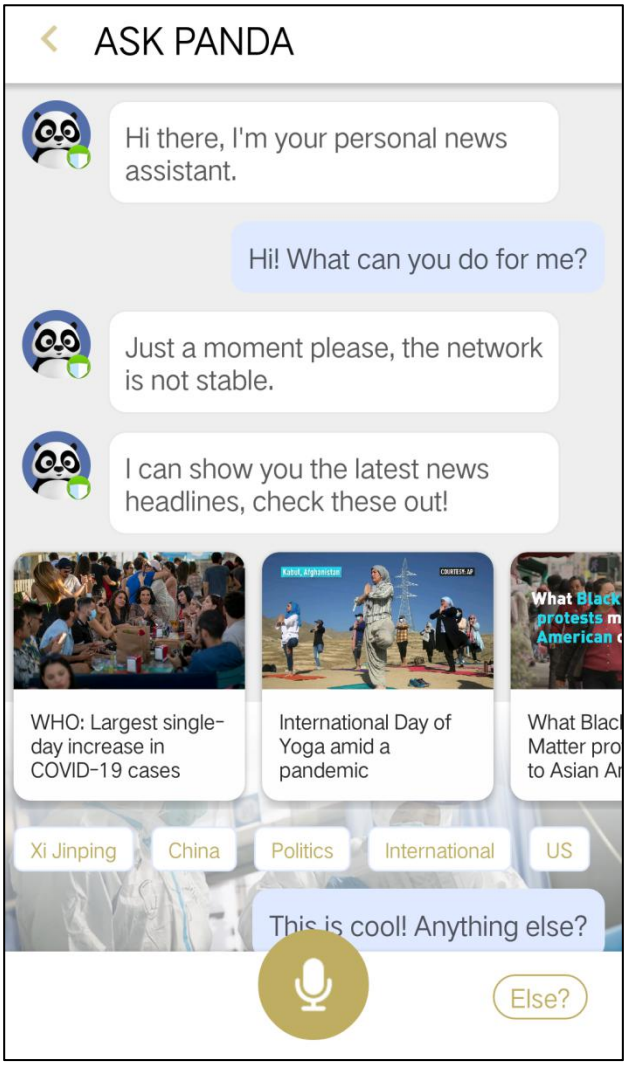

Figure 5.2 A screenshot of the conversation with the built-in chatbot (ASK PANDA) of the CGTN APP (Android Version 5.7.3)

5.2.2. CNN

Platform ensemble of CNN: HLN cable channel, CNN Original Series, CNN films, APP, Apple tvOS, Android TV, Samsung TV, Apple TV, Roku, Amazon Fire TV, Apple Watch, Apple News, Samsung Gear, Amazon Echo, Google Home, Facebook, Twitter, Instagram, YouTube, Mobile phone news services, etc.

Table 5.2 Platform analysis of CNN. Source: Own elaboration.

	Platform Functionality	Mobile Mediality	Platform-based Sociality	Platform Automation	Content Module
Website	Four editions(U.S., International, Arabic, Español), Animation, News buzz, Ads, Trending stories, Smartfeed Ads content, Virtual reality & 360° video, Paid TV live, films, TV series	News sharing, Newsletter	N/A	N/A	Ads, Videos, Photos, Clustered by topics, News and buzz, Take a closer look, Featured sections, Paid content(ads), In case you missed it, etc.
APP (Android, Version 6.9)	Livee and replay of TV clips, Two editions(U.S. and international), Video and text together, News alerts, Customization, Ads, Closed Captions for videos	News sharing	N/A	N/A	Top news, Watch TV, Live and replay of video, Search on CNN, Saved stories, etc.
Apple Watch	News alert, etc.	Affirmative	N/A	N/A	Top news, story page, 12 personalized categories

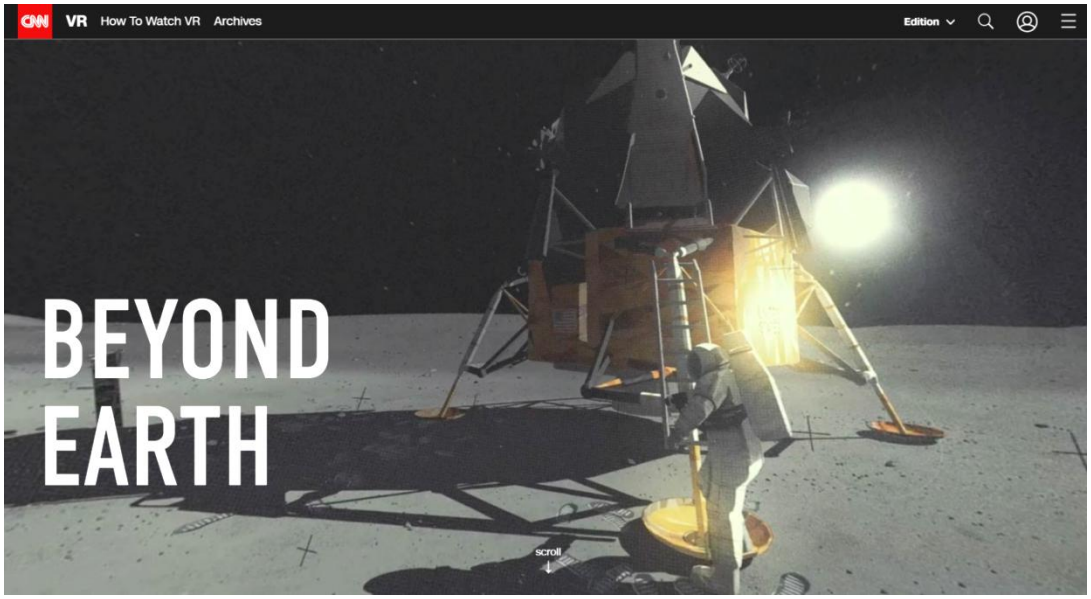

Figure 5.3 A screenshot of virtual reality & 360° video “Beyond Earth” on CNN Website. Retrieved June 22, 2020, from https://edition.cnn.com/vr

5.3. Conclusions

Apart from designing and applying platform analysis method via six parameters, i.e. platform ensemble, platform functionality, mobile mediality, platform-based sociality, platform automation and content module, we choose CGTN and CNN as cases to give a brief idea of how mainstream TV news media assume platform logic, on account of different media environments (Hepp, 2019) in which interlace political logic, commercial logic, media logic and news logic, etc.

We find that CGTN and CNN both have built their platform ensemble, channel ensemble, and similar content module. They undergird platform functionality largely through official websites and their own APP, but mainly rely on third parties to cultivate mobile mediality, platform-based sociality and platform automation. More apparently on its website and APP, advertising is CNN’s one main form of platform-based sociality. Comparatively, CGTN is highlighted by its 5G, VR, AR applications and gamifications,

and its own ability for platform automation (e.g. chatbot). Although also building its VR lab, CNN outstands in the cooperation with third-party digital platforms and multi-media content production (e.g. films, TV series).

It seems that platform logic has yet to be fully adopted in platform construction of CGTN and CNN, as the quaternions (q.v. section 4.2) of platform logic are not profoundly and systematically developed. Regarding platform functionality which is relatively more applied by CGTN and CNN, it is still not thoroughly acquired, because of lacking user's active participation of content augmentation (Martin, 2015), active consumption, discursive activity, personal and psychological connection and experience.

Notes

1 The denotation of news logic is here limited to journalism norms and regulations, news values and news routines.

2 By mimicking cable news (Gallagher, 2019), Donald Trump's political campaign team launches Webcast and other information outlets to support its political course and 2020 presidential campaign, such as Real News Updates and Real News Insights, ostensibly in competition with what Donald Trump calls "Fake" News.

3 Jigsaw Research. News Consumption in the UK: 2019. Fieldwork dates: November 2018 and March 2019. Published: 24 July 2019. https://www.ofcom.org.uk/__data/assets/pdf_file/0027/157914/uk-news-consumption-2019-report.pdf

4 Pew Research Center. Americans Still Prefer Watching to Reading the News – and Mostly Still Through Television. Fieldwork dates: July 30-Aug. 12, 2018. Published: 3 December 2018. https://www.journalism.org/2018/12/03/americans-still-prefer-watching-to-reading-the-news-and-mostly-still-through-television/

5 "[T]he extent to which audiences perceive specific media as news." (Edgerly et al., 2020)

6 China Global Television Network. https://www.cgtn.com/about-us

7 Cable News Network. Its parent company is WarnerMedia which is a subsidiary of AT&T. https://edition.cnn.com/about

Part II Platformization as an approach for intelligent news routines

AI Journalism:

How platformization refigures news detection, curation and distribution

Chapter 6
When Journalism Encounters Platformization

Social behaviors and perceptions are predisposed to the evolution and revolution of technologies and industries. Meanwhile, the reality is being reconstructed in many domains of life. Against this backdrop, artificial intelligence (AI) is being introduced to the milieu of journalism and communication by not only media corporations, but also technology companies and regulative authorities, which draws academia's much attention very recently (e.g. Clerwall, 2014; Carlson, 2015; Thurman, Dörr and Kunert, 2017; Jung and Song et al., 2017; Kim, D. and Kim, S., 2017; Caswell and Dörr, 2018; Tatalovic, 2018).

Automated writing is the frontier of the contact between AI and journalism, which can date back to at least the 70s (e.g. Harry, 1970). What is really new, however, is the intense intersection or generalized hybridization of artificial intelligence and journalism in a totally new environment characterized by two decisive features:

(1) A new communication ecosystem formed through a) the full digitalization of information; b) media convergence; c) the massification of the Internet; d) the socialization of social networks and the economy; e) the platformization of daily communication.

(2) The profound advance of globalization, through the generalization of transnational communications, and the consolidation of a massive international public sphere, notwithstanding the resistance from protectionism and nationalism.

On the other hand, this confluence between journalism and artificial intelligence is one more aspect of a generalized hybridization between the activity of intelligent machines and myriad human practices, such as health service, education, industrial manufacture, political communication, etc. (e.g. Budiharto et al, 2017; Androutsopoulou et al, 2018)

Facing this new relationship between journalistic activities and intelligent machines, A

new framework is proposed and is featured by the comprehensive mediatization of society and the increasing robotization of life.

6.1. Platform automation of newsroom

More than 60 years ago (1956), a DARPA-sponsored summer conference was held at Dartmouth College. This conference is memorable for the proposition of the term "Artificial Intelligence", although the operations of artificial intelligence, such as Turing Test, had been acting before the term made its advent. About half a century ago, Glahn (1970) published the seminal paper "Computer-Produced Worded Forecasts"[1] which is one of the first forays into automated news writing. More than a decade ago, Matsumoto et al. (2007) designed and made one of the first journalistic robots that could automate the routines from news finding, news recording, to news writing. In the second decade of this century, the integration of AI, automated writing, robotics into journalistic routines is emerging and active, while introducing and enriching the connotation of this amalgamation by introducing more methods and technologies, including automated editing of video and audio, AI-synthesized news anchors, and humanoid robot-journalists.

Normally, journalists perform news routines following the phases. (1) Consultation and identification of news events. This is the activity developed by journalists to detect and select those facts that are susceptible to news worthiness. (2) Compilation and arrangement of information. It is the activity aimed at compiling information, to classify it and to organize it in the face of its friction and the construction of a certain content. (3) Content production. It is the process by which a certain content is elaborated. (4) Publication. This is the procedure by which a content already prepared by the journalist or the news is disseminated through a certain medium. (5) Archiving. It is the work of filing and labeling the content developed and making available by the public or journalists. (6) Monitoring, Getting feedback from, and responding to the news users and the public.

The technological changes for journalism affect journalistic work forms and workflow which are rooted in the affordances of technical capacities and in this case newsroom (e.g. Van Der Kaa et al., 2014) as a complex of platform automation designed to integrate into

news routines. While, this introduction of AI to newsrooms is more fundamental compared to the previous technological introduction i.e. computerization, due to AI's ability of decision making, planning and the possibility of journalistic reinvention. On the other way around, newsrooms necessitate AI (a) more effectively telling stories across platforms in different formats, (b) relieving the press from ad decline and competition, (c) personalizing content at scale and higher speed, (d) combating misinformation and trust declination.

AI-applied newsroom is a system of hybridization between human journalists and AI/robot journalists, a system compatible with trans-formats and mass-personalized, although the news routines are still news gathering and verification, news production, news transcription, news distribution and news archiving (Named Entity Recognition), etc.

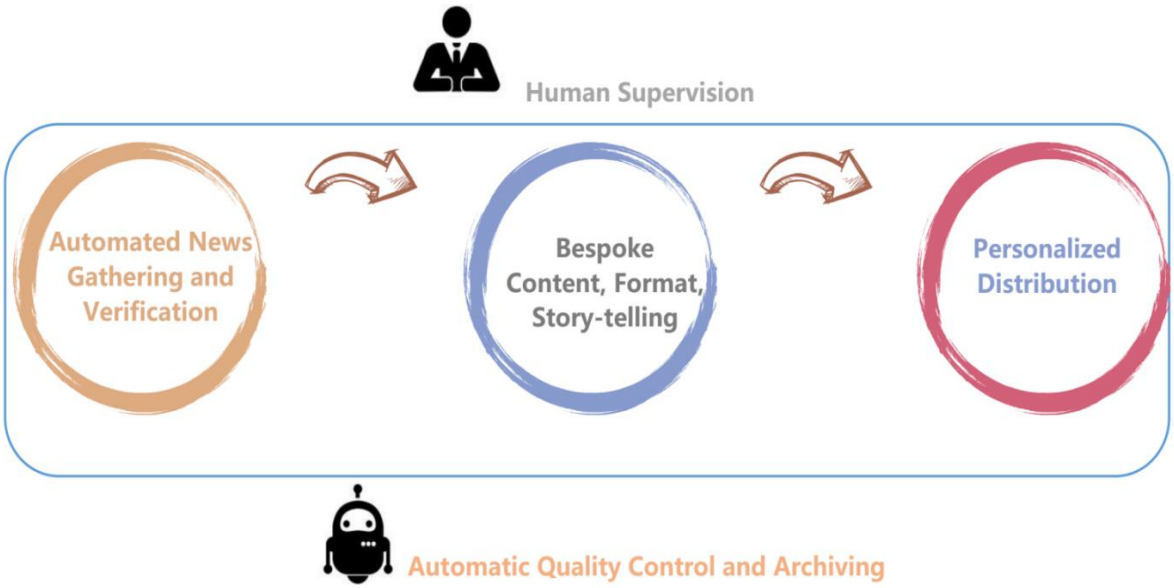

Figure 6.1 Hybridization of human and AI/robot journalists in news routines. Source: Own elaboration.

6.2. AI journalism

6.2.1. Denotation

Different from the previous practices of robotic storytelling, automatic text summaries and weather forecasts about half a century ago (Galily, 2018), the confluence between journalism and artificial intelligence was called AI journalism, which is at the moment also called, from different studying perspectives, as automated journalism (Carlson, 2015), robot journalism (Clerwall, 2014), algorithmic journalism (Anderson, 2013; Dörr, 2016) and has been defined by Dörr (2016) as "the (semi)-automated process of NLG by the selection of electronic data from private or public databases (input), the assignment of relevance of pre-selected or non-selected data characteristics, the processing and structuring of the relevant data-sets to a semantic structure (throughput), and the publishing of the final text on an online or offline platform with a certain reach (output)."

However, from our point of view this characterization if it was valid for the initial moment is insufficient today. The confluence currently occurring between journalism and artificial intelligence is a more complex and much broader phenomenon than automatic writing. The integration of AI into journalism in reality has to do with the dynamic of automatic systems and computers that are inserted and actively interfere with the standard task of journalists by modifying it in some cases in a very radical way (e.g. automated TV news program live editing and directing, AI-synthesized news anchor). Furthermore, the confluence alters the relations that were formulated in the communication ecosystem, including the established power relations, and to some degree infiltrates into the institutionalization of education and politics. In this sense, we are witnessing an authentic mediatization process in which automation technology -- or a set of technologies -- profoundly alters the predetermined communication system. The set of technologies made up of computers, sophisticated computer programs, structured, unstructured and semi-structured databases, advanced algorithms and a host of devices capable of collecting and processing information have been inserted into the usual circuit of journalistic production, modifying it very deeply and altering almost all its structures. Consequently, the traditional activity of journalists -- through the activities of new computing capabilities,

big data, cognitive computing, learning machines, new techniques of neural programming and, in a broad sense, artificial intelligence -- has been seriously transformed into multiple facets: selection, collection and systematization of information; writing and production; dissemination, distribution and personalization of information; and, finally, the relationship between journalists, as issuers, and the receiving users.

AI journalism is a trans-domain and interdisciplinary field concerned with the automation of news routines and the interaction between AI and human journalists, by virtue of different domain knowledge, i.e. linguistics, narratology, computation and statistics, media economy and politics, last but not least--communication and journalism. AI journalism is also a burgeoning sphere that transits engineering, media economy, geopolitics, philosophy of technology, etc. It is also a trans-domain knowledge that ironically lacks domain knowledge theoretically and systematically, while facing the demand for reasonable solution or dissolution of threats, that is, (a) fake news, (b) low quality of journalism, (c) human journalists' job security, (d) underlying powers of influencing democracy and existent social orders and political apparatuses, (e) the confusion of ethics and authorship, (f) the tension between disintermediation[2] and algorithmic institutionalization. In particular, compared to computational science, computational linguistics and narratology, theories of journalism and communication are the short slab, in terms of comprehensively understanding and instructing AI (and relevant technologies) applied into news detection, verification, generation, dissemination, archiving, and quality control.

Specifically, the combined sphere of AI and journalism is influenced by many factors which fall into five key variables. (1) Technology. Affective AI, Deep/Machine Learning, Facial/Image recognition, Neuromorphic Computing, Big Data & Analytics, AR & VR, IoT, NLP & NLG, Robots & Automation, etc. (2) Journalistic routine. News workflow and routines are changing in reaction to the technological introduction and innovation of newsrooms and media environment in general, such as automated newsrooms and smart cities. (3) Institution. Institutional pressure, algorithmic logic and political power from routines, regulations, norms and interpretive frames and conceptions of reality. (4) Literacy. Competences and knowledge of appropriately applying technologies for self-development

and quality news, taking into account of news routines, AI ethics, media laws, AI policies, etc. (5) Revenue. Maximize public interest, media profit and audiences' interest for sustainable development and quality journalism, while dealing with the relation between human journalists and robot journalists, human intelligence and artificial intelligence.

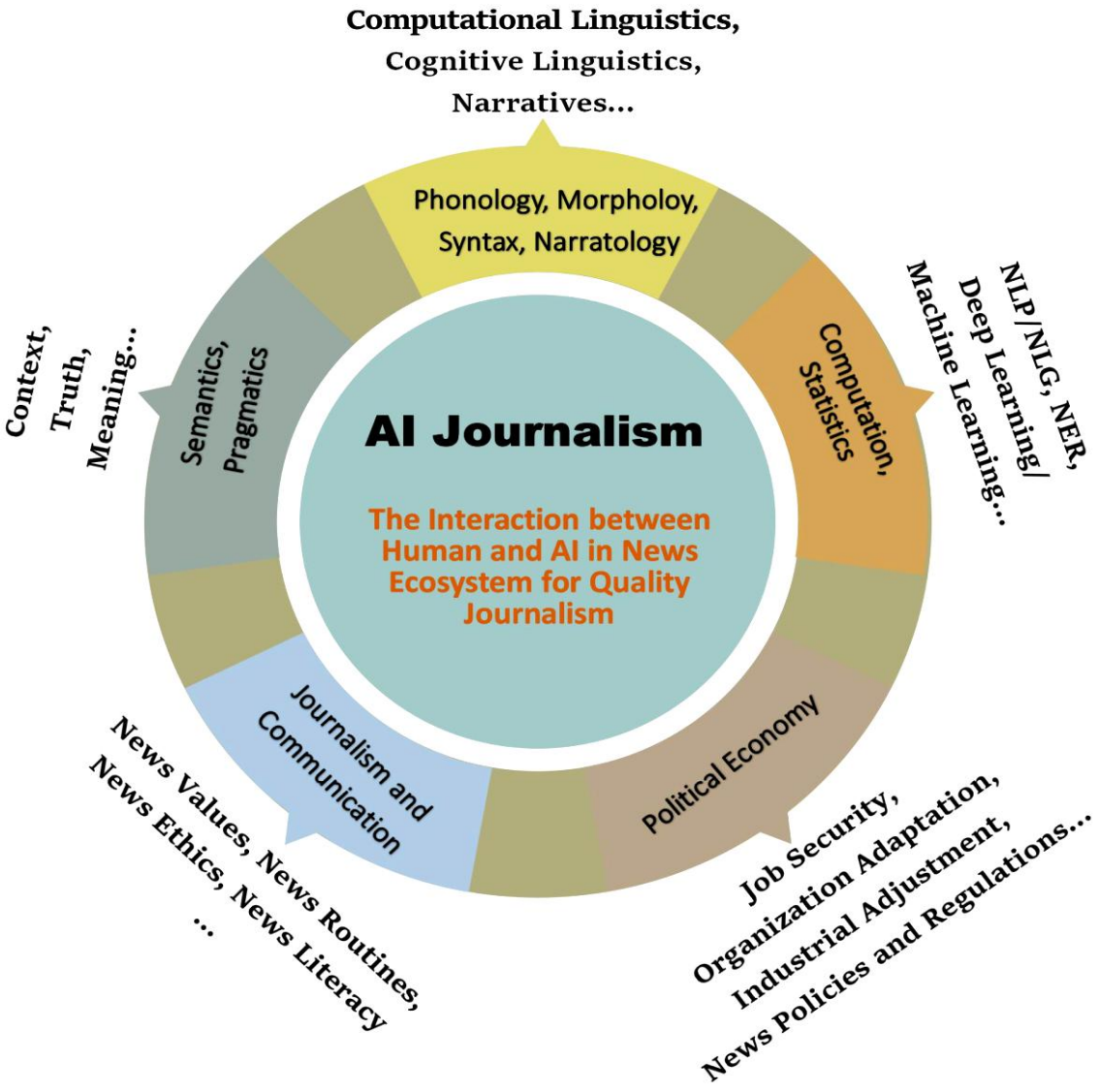

Figure 6.2 Different domains that constitute AI journalism. Source: Own elaboration.

6.2.2. Media Praxis

"In 2012, Forbes.com announced its use of Narrative Science ' s Quill platform to automatically create company earnings previews."(Graefe, 2016)

In 2014, the website of the Los Angeles Times used a software Quakebot to report an earthquake struck Los Angeles, only three minutes after the rumbling stopped(Carlson, 2015). The Los Angeles Times has another platform to report on crimes in the city, with human editors' decisions of which stories need greater attention[3].

The Associated Press drew on Automated Insights' natural language generation (NLG) software, Wordsmith, to "auto-summarize the quarterly financial recaps". "The configuration process involved feeding AP's editorial rules and relevant financial data into the platform and tweaking the system to adjust the expected output summary over time."[4]

Thomson Reuters uses AI to "cover beats it would otherwise be uneconomical to cover, such as some US sports, and utilizing the technology to produce not only text but also short audiovisual reports".(Thurman, Dörr & Kunert, 2017)

Reuters cooperates with semantic technology company Graphiq to provide news publishers with interactive data visualizations and data-driven news. The platform News Tracer of Reuters also help journalists to spot and validate news in real time on Twitter. Reuters also applies Text-to-Video technology by the software firm Wibbitz to produce videos.[5]

The Xinhua News Agency in cooperation with Alibaba Group developed the platform "MAGIC" which is a combination of MGC(machine-generated content) and AI, and is "designed to be incorporated into every stage of news production, from finding leads, to news gathering, editing, distribution and finally feedback analysis." The platform is ¨supported by four intelligent sub-systems, namely data mining, an intelligent database, AI algorithms and a recommendation system¨.[6] It has been able to automatically generate a news video reporting 2018 FIFA World Cup Match in as fast as 6 seconds, and as many as over tens of thousands of news videos for the World Cup.[7] Xinhua News Agency, among other Chinese media, also used physical robot journalists to report political sessions[8] in

2017. On 15 June 2019, the Xinhua News Agency presented its three artificial intelligence (AI) news anchors, one speaks English, one Chinese, and another Russian at the sixth News Agencies World Congress[9].

Nippon Television Network Corporation (Nippon TV), in 2018, hired a humanoid TV Anchor, Erica Aoi. She is an Android announcer and anchors TV programs regularly. She is determined to accomplish various TV routines, such as reading news, interviewing, assisting programs and sports commentary.[10]

In 2017, the Press Association(PA), the national news agency for the UK and Ireland, and Urbs Media, a start-up specialising in data-driven news, had received a grant worth € 706,000 from Google's Digital News Initiative (DNI) Innovation Fund for RADAR(Reporters And Data And Robots), a new service which would create up to 30,000 localised stories each month from open data sets across different distribution platforms.[11]

BBC employs AI in news searching, news visualization and TV programme directing. Specifically, BBC Juicer is its bespoke news aggregation and content extraction API, and scrapes news articles, both raw texts and metadata (e.g. date, time, title, news source). BBC also applies a automated video translation software to producing videos from data. On top of that, BBC utilizes AI as programme director, based upon that the cuts normally decided on by AI are relatively simple, involving the switch from one panellist to another when they come to speak.[12]

The Washington Post, after purchased by Amazon, tested the AI wrting program Heliograf that "automates report-writing using predefined narrative templates and phrases". "Heliograf spat out around 300 short reports and alerts on the Rio Olympics." Since then, it has been capitalized on producing stories and tweets in terms of congressional and gubernatorial races on Election Day, D.C.-area high school football games, and the 2018 Winter Olympics(Twitter @WPOlyBot).[13] In addition, the Washington Post has "developed TruthTeller to automatically fact-check political speeches in real time"(Carlson, 2015).

The New York Times launched the AI project known as Editor to simplify the journalistic process and provide fast and accurate fact checking. Furthermore, the Perspective API is deployed to moderate reader comments, encourage constructive discussion and eliminate harassment and abuse.[14]

The Sports Illustrated has developed InHabit to deliver contextually-relevant content created by humans, and scaled by AI. Its interactive data visualizations enhance editorial and boost user-interaction, while delivering brand messaging to focused and active users.[15]

In a memo to Bloomberg's staff in 2016, Editor-in-Chief John Micklethwait announced that the data-driven news organization was creating a 10-person team to determine how automation could be used throughout the company's portfolio of editorial products. Bloomberg, which had already used automation for news alerts, customized news and trending stories, would use automation for many of their new initiatives.[16]

With Google data, visualized by Google News Lab with design studio Polygraph, big Data Visualization is actualized based on aggregated, anonymized, and differentially private data from users who have opted in to Google Location History.[17]

Tencent's robot reporter Dreamwriter is capable of churning out a perfect around 1,000-word news story in 60 seconds. The first published news of this robot was about China’s consumer price index. Meanwhile, Dreamwriter can also write a report about a speech automatically. For instance, executive editor of news site Quartz, Zach Seward, had one of his own speeches at a conference written up this way, and he was impressed.[18]

NTB, which is the Norway’s largest provider of content in the form of text, images, video and graphics to Norwegian media, has automated its football coverage, with its match reports written by a robot journalist and published within 30 seconds of the end of the game.[19]

Yonhap News Agency has introduced an automated reporting system, Soccerbot, to produce news on English Premier League (EPL) football games, a key milestone in its efforts to improve coverage and expand technology-based journalism. The program utilizes

a database of words and sentences written by Yonhap reporters. It produces articles in three steps -- collecting data, writing sentences, and going through spelling and grammar checks. The robot reporter also gathers data from up to five different sources to identify incorrect information, and can be used to report PyeongChang Olympics.[20]

Among the media practices, many technology companies play a great role, such as Arria, Narrative Science, AX Semantics, Text-On, Textomatic, 2txt NLG, Retresco, Yandex, Polygraph, Urbs.media, Syllabs, Labsense, Tencent and Automated Insights, proffering either customized or off-the-shelf AI platforms.

6.2.3. Categories

It is increasingly evident that AI is being imported into communication sphere, while disguising itself to fit into the daily life which could easily lead news producers and consumers to feel unease and confused although simultaneously enjoy the AI-made feast and gradually take it for granted. The first step to eliminate the anxiety is to analytically distinguish the hitherto types of AI journalism.

Two noticeable areas applying AI journalism are sports news and financial reports. These two news beats share some same demands that make accepting news automation spontaneous, i.e. being accurate and low-cost and time-sensitive. For instance, Thomson Reuters uses news automation to report niche and less popular sport games which would otherwise be very uneconomical. NTB in Norway automates football coverage fast enough less than half a minute from the game ends. Xinhua News Agency could automatically produce video report for 2018 FIFA World Cup within 6 seconds after the match. With respect to finance and marketing spectrum, technology companies are the pioneers of financial report automation. The examples are the use of Forbes data on economy through a platform called Quill. The Associated Press has also used the Wordsmith platform to provide financial information. Tencent's robot reporter Dreamwriter can write a financial news story of around 1000 words in one minutes.

Another hot spot of AI automation is the news coverage for incidents and emergencies informing, which is also the start line of AI journalism. As early as 2014, the website of the

Los Angeles Times published a piece of news reporting the earthquake struck Los Angeles, within three minutes after the rumbling. Similar to natural disaster and emergency report, man-made incidents and events are fairly suitable for robots writing news in regard to crimes in the city (Los Angeles Times), congressional and gubernatorial races on election day (The Washington Post), etc.

Automated writing firstly used in these stories (e.g. reporting Finance, Sports, technology, real estate, government notice) benefits from the easy access of the structured data, and the pioneering value and immediacy of the descriptive fact-telling mechanisms developed attentively in the machine learning and deep learning. Nevertheless, mere summary, introduction and notification are obviously not qualified to meet the true values and humane concerns of journalism. For this, it needs to further clarify the relations between AI news writer and human journalist in the journalistic routines, and the categories accordingly, apart from the classification pursuant to the areas AI news reporting involved.

According to the extent to which the integration between AI machines and journalism, AI journalism can be divided into several sub-domains. First and foremost is what we call the supervised AI journalism, which is the mainstream for the current AI industry. This type of AI journalism relies upon human intervention for the production of AI-automated news and/or the final endorsement of publishing, which is either for the concern of news quality or the lack of confidence in the maturity, functionality and humanity. A pertinent example is that, in the Los Angels Times, human editors select the report on a crime in the city among many AI-written reports so as to publish the one of most news worthiness. Moreover, human supervision can take place in any phase of journalistic routine. Taking the Sports Illustrated as a case of human early intervention in the routine. The InHabit developed by the Sports Illustrated aims to scale up the content and quantity of news contextually-relevant which is predicated on the antecedently created content by human.

Comparatively, under the same criteria, the second genre is the unsupervised AI journalism. We admit that it is not possible to thoroughly exclude the human monitoring, at least at the present time. However, it is the attitude and tenor of limited human interference and the process from platform functionality to platform automation that compensate for the

uncertainty of technology and allow this happen, based on the mature institutionalization of AI automation in the ethical and legitimate aspects. One of the future research concentrations of AI is unsupervised deep learning which provides the opportunity to boost the enhanced automation of journalistic working procedure. Accompanying this, the system is increasingly self-directed and reflecting simulated creation. BBC has applied AI, for example, as programme director and video editor whose tasks involve shot cuts and switches between different speaking panellists.

Of course, as aforementioned, the whole process of coexistence between intelligent machines and journalism should be inspected not only in the domain of journalism or news, but also across the global communication ecosystem in the epoch marked with mediatization and robotization, which provokes many controversies socially, politically, economically and culturally, such as fake news or misinformation, journalist identity and subjectivity, big data malaise and dependency, task or job appropriation. To deal with these issues, AI journalism has been evolving since 1970s, and not least recently taken shape of a composition of functionalities. From this point of view, AI journalism can also be classified as follows:

(1) A genre of journalism able to automatically spot and validate news. Reuters leverages a platform called News Tracer to rapidly search news and check facts on Twitter. BBC has put the bespoke news aggregation and content extraction API into service. More cases, the Washington Post specifically focuses on the fact-check of political speeches in real time via its AI product TruthTeller. The New York Times also launched an analogous project (known as Editor) to simplify the journalistic process to counter fake news.

(2) A type of journalism underscoring data-driven news and interactive visualization. Big data compatibility is a built-in advantage for AI journalism, by virtue of the same pursuit of both structured data availability and intelligent data processing (e.g. data mining and neural network programming, Text-to-Video technology, automatically attaching news pictures), both of which seek value, volume, velocity and variety in the operation. On account of this trait, media organizations and news agencies are active to incorporate visualization and interaction into news production and presentation. For instance, the

platform Inhabit of the Sports Illustrated delivers context-relevant content with interactive data visualization. Reuters and BBC are both taking action to delve into this automation of producing videos from data.

(3) A type of journalism endorsing the identity of robot/virtual journalists. The ultimate automation is a totally imperceptible process that producing, distributing news without any human intervention. Many efforts and practices are taken to achieve this goal, which is inclined to pave the way for the legitimacy of robot journalists. Xinhua News Agency, among other Chinese media, employed physical robot journalists to report political sessions in 2017. After that, Xinhua News Agency, applying voice and image synthesis and deep learning technologies, unveiled virtual newsreaders. Reuters puts a digital twin onscreen of a real sportscaster to present game results with no scripting, no editing, and no production required beforehand. Nippon Television Network Corporation has hired a humanoid TV Anchor and news announcer, Erica Aoi, whose work covers various TV routines including news broadcast, interview, program assistance and sports commentary. Nonetheless, journalism is a calling of social and public responsibility, citizenship and independence, which is normally taken by the critical-thinking personhood. Thus, some tasks and even jobs are automated, while incurring the conundrum between empowerment of AI and disfranchise of humanity.

6.3. The major transformations

As we have indicated above, what could be seen from the phenomenon of confluence between two fields, i.e. artificial intelligence and journalism, has in fact become a process of mediatization that tends to change the traditional structures and dynamics. The process is closely related to the even broader mediatization of life that affects almost all domains of society, which is necessary to examine in a more general sense.

What are the main transformations to which the integration between AI and journalism aims? To answer this question, it is convenient to identify the most significant rising technologies in the sphere and identify which specific areas of journalism they affect. From this point of view, the following technologies and areas are considered.

(1) The emergence and consolidation of automated writing and producing of trans-media content, such as generation of journalistic texts and videos through the acceptance and pervasiveness of platform automation. The most directly involved area is journalistic writing and editing activity, until now exclusively for human beings, and indirectly for the process of information collection and selection.

(2) The robotic personalization of journalistic content in adaptation to the public and to the singular recipients. In this case, the area involved is the organizing activity of the information by the editors of journalistic information, the activity of information prioritization and hierarchization, and indirectly the way of interaction with the public and users.

(3) The global transformation of the journalistic ecosystem by the interaction of diverse devices for collection and automatic processing of information. In this respect, the two previous ones are included - automated news producing and robotic personalization - but others are added, such as the socialization of daily routine, the increase of social surveillance systems, the emergence of big data, the digitalization of media communication, etc. One of the most affected area by this transformation is the global activity of the public and journalists, and their relations.

6.3.1. Automated writing systems

The systems are the front edge of automated journalism, and are very preconditioned and afforded by technological development, normally through structured database retrieving, algorithmic writing and natural language processing. They are able to generate information in the form of: a) natural language (spoken or written); b) other languages understandable by the human being-audiovisual language, graphics, etc. The texts generated by automatic writing have to be, at least as a constituent principle, on the one hand, lexically, semantically and logically coherent, and on the other, conforming to and resembling the texts usually produced by human beings. The optimal result is reached when readers can not even suspect that such texts are produced by a machine.

Therefore, we are facing a scenario that aims to make the machines replace the activity

that humans have been doing until now, although this trend has existed since the first industrial revolution. At this time, the role of journalists is under the threat of being supplanted, and newsroom institutions are being reconciled to algorithms (Napoli, 2014). It is the substitution of subjectivity and personhood that attempts cover up itself by means of downplaying the effect merely as actions and procedures.

To understand this situation, two questions deserve to evidently put forward. What characteristics does this substitution have? What human value is lost in it?

Automated journalistic writing aims to replace some of human journalists' tasks, via providing news faster and more efficiently to the ecosystem. It can multiply the production capacity and improve the ability of timeliness of the aforementioned events. In this regard, this technology directly affects many of the journalists' writing tasks, and broadly transform the way in which the information is collected, processed, presented and disseminated.

In cases that are currently known as automated journalistic writing, generally, the input of data to generate the language comes from databases whose ordering and structuring are predetermined by the same logic of the base in which they are recorded. For example, the results of a football league, stock quotes, weather variations, the development of seismic movements. This information has two characteristics: a) it can be divided into categories or attributes according to a very precise logic: b) the variations occur within the established categories. Take football match as an instance, a team may have won, lost or tied with another and, at the same time, may have achieved a certain number of goals that are within expected margins.

Apart from the inherent logic base of certain beat reporting boosting the application of automated writing, therein lies more the same rationality: a) they respond to predetermined and pre-programmed sequences and arrangements; and b) they vary within the categories established according to predetermined parameters. Therefore, in essence, what has been lost in terms of automated writing relates to two orders of values, at least up to now.

The first of them, the meaningful reporting angle and perspicacious capture of the event. The robotized writing is adept at working within a routine and foreseeable development of the events, but it is overflowed, precisely, if it has to face a previously

unstructured event, e.g. the unpredictable progress of fact. Since deep leaning technology that these systems commonly apply relies upon plentiful experiences as the pathway to expertise, in a strict sense, it is unable to catch atypicality or process the singular and contingent event; nor can it capture the catastrophes that occur as a way of breaking with conventional guidelines and the emergence of a distinctive qualitative value. Nor can it capture the paradoxical and simply contradictory phenomena that can occur in reality. And, in the same way, it is refractory to what an authentic novelty can contain. Although, some efforts have been devoted to directly automated translation of event image into poetic text, as an attempt to add artificial intelligence machines some creativity of ingenious description (e.g. Microsoft Research Asia's program).

The second aspect in which automated writing lacks is the literacy, judgement of values, and the generation of texts that are not solely descriptive, especially those that perform meta-discursive and self-referential operations. The automated journalistic texts are one-dimensional descriptions, in most cases, with simple and elementary evaluations. Worse, when it comes to imitating texts with evaluative nuances, doubts, irony, sarcasm, ambiguity, intertextuality, and a multitude of other rhetorical operations, automated writing tends to conspicuously navigate without being able to approach this phenomenon that composes usual literary practices.

Returning to the initial question in this section, what human values are being lost with automated writing?

(1) The right to learn the truth of news making is shaded by algorithmic vagueness.

Algorithms are "black boxes" to the audience and are likely to change in accordance with business decisions and political wills, "while hiding their underlying assumptions, ideologies and premises," notwithstanding that touting themselves as free of interest, errors and subjectivity (Montal & Reich, 2017).

The logic for formulating specified stories are normally shaded from news consumers. Whereas, when AI plays as personal journalist to create personalized stories, the receiving party of AI news is entitled to be informed of "what the algorithm knows about them or how their story differs from what other users see," (Graefe, 2016) let alone transparency is

a key tenet of journalism ethics (Diakopoulos & Koliska, 2017).

Generally, the rationale of algorithmic vagueness encompasses lacking business incentives for disclosure and the concern of overwhelming information for news consumers. However, Diakopoulos & Koliska (2017)'s research manifests that news organizations can actually enhance user experience by align information disclosures with news. The crux is "how to best disclose information without disturbing the user experience, in particular, for those who are not interested in such information" in the operational level (Graefe, 2016).

(2) Automated writing systems curtail the capacity of human reaction to the singular and serendipity, and even more to the radically diverse. It lacks the sense of surprise and opportunity, and furthermore the morality and ability to react with original and ethical attitudes before the authentic novelty. Its vision of events is likely to be partial and fragmented, with seldom holistic sense or capacity for gestalt comprehension and perception.

(3) The writing produced by robots is, for now, elementary, descriptive, merely informative, stereotyped and routine. It does not approach the complex aesthetic subtlety of human writing at present, albeit with the tendency of being more predictive and creative in the near future which we don't doubt. One crucial limitation of automated writing applied into journalism is the deficiency of prerequisite news literacy and critical ability to produce meaning through ambiguity, irony, passion, sympathy, etc. Comparatively, human journalists can cultivate these abilities through education and practices.

6.3.2. Personalization systems

It is the personalization system that handles data of users, their relevant habits and the contexts in which they contact, and takes them into account when writing, presenting or distributing contents[21]. By virtue of the database, these systems are set to deal with the interaction between distinct users and automated writing technology in order to shape identified personal news ecosystems that generate and distribute customized genres (Rishes et al., 2013) of information for different cohorts of users, even every singular user.

These information personalization systems can be adapted to differentiated and localized contexts and to unique individuals, taking into account a great number of possible variables and combinations. Specifically taking into consideration of news dissemination, there are generally four approaches, i.e. content-based recommendation, collaborative-filtering recommendation, graph-based recommendation, and context-aware recommendation. Besides, many hybrids of any of the four approaches are being investigated (e.g. Lv et al., 2017).

Content-based recommendation focuses on modeling user profiles through analyzing the rating and consumed news of users (Lv et al., 2017), navigating history and search profiles within or beyond news services (Duwairi et al., 2016; Bai, et al., 2017), and among others.

Collaborative-filtering recommendation is on account of the assumption that "people with similar preferences will rate the same objects with similar ratings" (Tang et al., 2013, cited by Campana et al., 2017). For instance, social network information can be incorporated into the user model to "predict the missing values in the user-item matrix." (Sun et al., 2015)

Graph-based recommendation leverages on social networks modeled as graphs, "in which nodes represent users and items, and edges model the different relationships among user-user or user-item pairs." (Campana et al., 2017) This recommendation is dependent on the presumption that "a node is important if it is linked to other important nodes," (ibid.)

Context-aware recommendation adopts contextual information, such as spatio-temporal and environmental context factors, task context factors (walking, driving, or biking), to the system.(Gasparetti, 2017; Eirinaki et al., 2018)

User profiling (also known as user modeling) is a major process for news personalization and recommendation, which is subject to the problem of data sparsity, cold-start problem and over-fitting problem. The key to these problems is the delicate balance between accuracy and serendipity, which is one of the cruxes of solving the conundrum between news personalization and platform discrimination[22].

Serendipity is divided into individual diversity, aggregate diversity and novelty (Gogna et al., 2017), and manifested as the probability to access the "items not only relevant and novel to the target user, but also significantly different from the items that the user has rated." (Kotkov et al., 2016) The contradiction between accuracy and serendipity is not inevitable at least from the algorithmic perspective (Kunaver et al. 2017), in light of the three-phase algorithm: "Pre-filtering: A recommendation algorithm preprocesses the input data for an accuracy-oriented algorithm to improve serendipity. Modeling: A recommendation algorithm improves serendipity in the phase of generating recommendations. Post-filtering: A recommendation algorithm reranks the results of accuracy-oriented algorithms." (Kotkov et al., 2016)

Another method to alleviate platform discrimination in news personalization is bolstering the context-aware recommendation system. It is because not only the fact that this system is added other variables (e.g. place, time) to pick items (Kotkov et al., 2016), but also the demand of the logic of news contextualization and platformization.

Naturally, these personalization systems can be applied and combined with the automatic writing of texts, giving rise to the more complicated ecosystems that open up a multitude of possibilities. However, the combined systems suffer from the defects: a) they have to use structured databases according to predetermined logics and variables, with which they can hardly catch novelty and eccentricity; and b) they produce prototyped, formatted and routine texts, which are readily stereotyped in spite of appearances.

Notwithstanding the deficiencies, AI improves the performance of conventional mass communication -- a single uniform message for many people to the next level of mass personalization[23], as the systems are being more audience-centric due to the craving for users' data, processing abilities and more importantly the economic and political powers.

But in many cases, it fails to bring out the same human values as human intelligence, on the contrary aspires to opportunities of supplanting some practices of journalists.

6.3.3. Hybridized systems between journalists and machines

Many other combinations are also emerging in which computers complement, enrich or replace the work of journalists. Many artificial intelligent machines represent and epitomize the combinations, such as those can automatically transit verbal voices into text, texts into audio and video, and translate them into different languages in real time. And the alert systems are able to search on social networks and detect emergent news at the origin, to name a few. In this pattern, we are responding to not a single activity, but almost a whole set activities related to journalism, which are transforming, sometimes imperceptibly, but globally and intensely.

An effective way to making sense of these complex systems of interrelation is to accept that a new working environment is being created, and that a new ecosystem where human agents are related to non-human agents, with diverse artifacts and technologies, enters into authentically new dynamics. Both of them tend to increase the magnitude and complexity of the whole, either in the horizon of journalist working routines or mediatization of society. There is, hence, more information and more energetic information circulation. And the qualitative relationships between almost all the agents and products are constructed, which are more complicated and difficult to regulate, at least apparently.

These lead us again back to the aforementioned question: what human value is lost in this context? It is, for human beings, the lacking of both comprehensibility of the complexity, and intelligibility of the context that exceed their capacity and ultimately harms their autonomy. Therefore, it is contributive to dissect the dilemmas perplexing the current situation.

6.4. The current quandaries

The impact of artificial intelligence introduced into news ecosystem can be transcendent. On the one hand, the tasks, particularly the repetitive ones with fixed paradigms, performed by humans are prone to be superseded. On the other hand, AI-produced news emphasizes the foreseeable events that previously structured, and tend to expel the singular and the authentic novelty, which produce significant disruptions in the system. And in general, AI writing prescribes the texts that contain certain language games and defined rhetorical subtleties, upon which, therefore, the systems of comprehension are based.

All of these are practically for the consideration of the construction of behavioral systems and for the benefit of discernible mental models that are contingent on the fragmentation of social action into elementary and manipulable particles that can easily be lent to routine programming. Moreover, the new communication ecosystem is where all these taking place.

What happens if the advance of AI journalism is circumscribed in the domain of reductionism and functionalism?

(1) It would marginalize and supplant the human character of journalism: it is not an exaggeration to think that machines can one day eradicate people from some of the tasks of journalism. And this can not only cause job losses, but also very probably the loss of quality. Journalism would have to bear the risk of losing its critical, moral and ethical side. And the manipulation of information could become a dominant reality.

(2) The hidden and incomprehensible side of information production would be extended. The more automatic and AI-programmed the behavior of machines, the more difficult to control their programming and algorithms from escaping the public examination. In this way, power relations could be unbalanced and the social world may become less and less intelligible.

(3) Finally, reductionism would be enhanced when it comes to understanding the world and human relations. A journalism reduced to the repetitive behavior of computers

and subject to the functionalist criteria of its programming can produce an intellection of the reduced universe, radically anti-innovative, and very uncritical, not creative at all.

Therefore, each of these negative visions confronts us with many conundrums that need to be decidedly resolved. Will AI journalists[24] cheat or make fake news? What operations can we trust the machine to do and what not? What kind of impersonations or simulations of human presence should we authorize and what not? What degree of transparency and openness should we demand from the different codes and systems that can be inserted in the intelligent platformization of journalism? What regulations and guarantees have to be clear from the beginning in the process of platformization and robotization of some journalistic activities? What kind of experimentation is permissible to carry out and what is not? And, in any case, what precautions and guarantees should we give to experimentation?

The confluence between intelligent machines and journalism brings transformations to fit in the evolution of media and transformation of everyday life. To identify and clarify the quandaries, it demands the active adaptation and acclimatization of both the way of thinking in a micro level and recasting of journalistic environment.

In this context, the important question nowadays is whether this type of mediation and the growing robotization of journalism will be good or bad for the progress of journalism encountering AI. In other words, how many benefits and how many risks or damages can it generate?

Although the question is intricate to answer and deserves many nuances, there are usually two forms, often with latent responses. (1) If Artificial Intelligence can coexist and complement the current tasks of journalism, we will have a happy ending to the story. Success and optimism, then. Benefits, both for the human being and for the development of technology. In a way, if we respond like this, we place ourselves in an optimistic frame: the machines will enrich human beings and free them from routine, repetitive and grunt work, allowing them to be freer, more creative and more efficient in their tasks. (2) If AI supplants human journalists, usurps their tasks and deprives them of humanity, in reality journalism would lose. Fatal end or pessimistic frame: the confrontational tension. To be specific,

machines may displace humans, or, ultimately, extinguish the authentic humanism.

Exactly in the process where the contradictory frames exist, new humanity (Pérez Tornero et al., 2010) is shaping through information generation and communication. The underling logic that digital platforms increasingly represent the “physical and social personality of humans”(ibid.) is raising the query: whether the presupposed antagonism can convert into coexistence, even co-evolution.

This is the reason why the analysis, reflection and debate on how to integrate artificial intelligence in journalism is a timely matter of ethical, educational, social and political significance. It is a debate, certainly, that can not be ignored, when it comes to defending, sustaining and developing an independent public journalism committed to human beings as appropriate, coupled with different specificities of both public broadcast and public education that relate with journalism.

Most likely, reality can not be resolved by only choosing one frame or another. The evolution does not aim to propose a either-or situation, neither will not be much more complicated than what these scenarios suggest, and the risks and benefits will be distributed in a very fluid, even surprising and random way. Thus, we will need - if we want to understand and analyze what would happen -- a style of thought that is multifarious, creative, and attentive to the actuality. Only then we can acquire full awareness of our era institutionalized by algorithms to some extent (e.g. Napoli, 2014). And only on this wise, we can respond to the dilemmas approaching us.

6.5. Conclusions

If platform automation is increasingly functioning, platformization is likely to be rendered as an intelligence to a certain extent, which is at least embodied in the automation of newsroom and news routines. AI journalism hence emerges and performs across media entities, which ushers transformations in respect of automated news writing, personalization system, and hyridization system between human journalists and automatic platforms. These transformations may lead to the quandary that AI journalism is predisposed to the confinement of reductionism and functionalism.

And we admit that AI journalism is a constantly progressing area as the fast technological innovation and implementation in news practices, thus the emblematic cases we analyzed could not give a complete picture of the industry. But for the same reason, this study is conducive to proffering a general framework to envision the rationale behind the hastiness and malaise of applying AI and associated technologies into journalism practices.

Notes

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20 http://english.yonhapnews.co.kr/business/2017/08/14/0503000000AEN20170814005000320.html

21 For example: https://www.presshalo.com/

22 We define platform discrimination as the platforms' deprivation of rights from citizen-users to access various needed information.

23 Personalization at scale, such as a unique news piece for any singular news user.

24 Bot or robot that is applied and integrated into news routines.

Chapter 7
Ontological Framework of AI Journalism

7.1. Transcending ontological discrepancy

When taking into consideration of Artificial Intelligence's application into journalistic working routines, as well as its potential capability of interfering media logic and even platformization, there exists AI malaise among journalists to some extent (Túñez-López et al., 2018). Many factors affect these uncertainties concerning job security, journalism quality, identification of fake news, robotization of newsrooms, cognitive economy, and algorithm hegemony, to name but a few. The foremost to revolve, we propose, is to define the ontology that can manifest the emerging phenomenon in the news ecosystem where intelligent machine and human journalist are coexisting.

AI journalism is a cross sphere of information and computational sciences, and journalism and communication sciences, among other pertinent disciplines, which poses an inevitable question: how to transcend the disciplinary barrier and boost the development of AI journalism in favor of citizenship and humanity? From the perspective of knowledge engineering, bridging the ontological discrepancy between different disciplinary comprehension paves the way for the further elucidation of the question. This study, hence, attempts to proffer the tentative ontological framework upon which news event detection, news curation, news distribution capitalizing on artificial intelligence and associated technologies are based.

In order to unravel the concepts and relations in the domain of AI and journalism, it is a desideratum of building the framework for an effective ontological comprehension of platform automation in the newsroom and beyond. From the perspective of knowledge engineering, ontology is normally accepted as formalized and explicit specification of shared conceptualization in the human understandable and machine processable format (Samani et al., 2018; Gruber, 1995). Drawing on the ontological methodology, it is a

prerequisite for explicitly conceptualizing and demarcating the borders of AI journalism, which is beneficial to both media researchers, news practitioners and technical staff to decrease the conceptual uncertainty (Samani et al., 2018).

AI journalism ontology is supposed to be technically informed and domain-specific (Hung, 2018). By contrast, this is the field unceasingly changing with the emerging technologies and techniques. Thus, it is a fluid ontology (Srinivasan, 2012) emphasizing inclusiveness and openness, as well as a weak ontology predicated upon abstraction and generalization of social and network interactions, cultural and spatial attributes (Hung, 2018). In spite of over-generalization, it is meaningful and feasible to define the ontology while endorsing ontological multiplicity and overarching different polities, multi-cultural issues, organizational and economic aspects (Damjanović et al., 2007), media environments, news production and consumption habits, etc.

7.2. Features and capacities

Teleology proffers the possibility and demonstrates the rationality for bridging the disciplinary discrepancy for relational elucidation and connotative compatibility between AI and journalism. It easily falls into utilitarianism and aims for building AI journalism ontology with the purpose of exerting the shared functionality. Hence, the procedural realization of common values, i.e. truth and trust (Ryfe, 2019; Tolk, 2013), is an approach to the ontological legitimacy, videlicet, to a certain and specific extent, how to apply the relevant knowledge based on the domain constraints. As such, it is crucial to find the features derived from journalistic routines and intelligent technologies.

The first feature is the intersection of knowledge models. AI journalism process covers an interdisciplinary combination of different domain knowledge constituted by software engineering, information communication, news curation and distribution, etc. Merely in the sphere of journalism, the knowledge structure varies with news beats in light of specified need of intended and targeted reporting. Meanwhile, the ontology of journalism is confronted by the rapid transactions of knowledge models (Ryfe, 2019), which is mostly accompanied by the lower threshold of participating journalism and the relinquishment of

power from professionals to citizens and finally to the nascent intelligent machines that intersect mechanical engineering, electrical engineering, and software engineering, where also exist diverse knowledge models (Damjanović et al., 2007).

The second feature is the fuzzy logic. AI journalism is framed by a kind of fuzzy ontology institutionalized by social structures and algorithms (Napoli, 2014). The algorithm institutionalization endows journalism with the automation of reasoning, prediction, planning and action, at the cost of fuzzy clustering and obscure relations, due to the inclination of connotational infidelity and discourse ambiguity (Samani et al., 2018) during idea translation (Driessens et al., 2017) among machines and humans. This translation is primarily implemented by intelligent modelling and simulation (Tolk, 2013) of soft computing which is specified "as a collection of techniques exploiting approximation and tolerance for imprecision and uncertainty in traditionally intractable problems"(Precup et al., 2012), and sacrifices explainability and transparency for computational intelligence (e.g. deep learning and the hidden layers) and expected approximation of reality.

As an applied ontology, AI journalism ontology not only manifests the above features upon which the classical ontologies depend (Samani et al., 2018), but also should serve for the valid application of journalistic domain knowledge into comprehensive ontological building, which pinpoints the urgency of taking account of the following capacities when building the ontological framework and understanding an AI journalism system.

(1) Knowledge auto-organization capacity

AI journalism system is identified from the previous newsroom automation as a cognitive system that "understands, learns and develops itself by social and individual interactions" (Precup et al., 2012). Through this process, the system develops its causal and relational conceptions between the signals obtained from sensorial sections and the use of situational interpretations. The signals and interpretations are the resources for the transference from experience to knowledge in the manner of so-called knowledge process, namely the knowledge auto-organization from a priori knowledge (established ahead) to a posteriori knowledge (by experiences) through iteration (Precup et al., 2012).

(2) Vagueness recognition capacity

Fuzziness of the targeted news events is one of the reasons why introducing AI into journalistic sphere, as AI is able and useful to model and simulate the actuality, although it is not the best option considering the difficulty of expounding the mechanism of human intelligence (Tolk, 2013) and finding the truth (Vosoughi et al., 2018). Moreover, journalism usually deals with human natural language and social connotation, which is vulnerable to "incompleteness in missing sensor readings", "uncertainty in sensor data acquisition" (Díaz-Rodríguez et al., 2014), and in need of ontology-based activity modeling.

(3) Heuristic capacity

The ontology should allow the discretion of defining rules for knowledge modelling and organization. This is not only the demand of journalism for active democracy and citizenship (Loader et al., 2011; Campbell, 2015), but also the indication by machine learning and other techniques applied into the news ecosystem. This capacity resonates with the fuzzy logic, inasmuch as the experimental method achieves the goals by manipulating variables dependent upon controlled methods and random assignments. Through the constant trial-and-error process and active rectification, the useful and reliable solutions can be gradually clarified in the experimentation dynamic of the machine-perceived causal relations as a source of knowledge (Precup et al., 2012).

(4) Dialogue capacity

Artificial intelligence is the upshot of interaction between learning mechanism, programmer, and the artificial environment in which robots are immersed. AI dialogue with internal and external contexts plays as the approach to contextual and cultural understanding, which is to a certain extent in resonant with actor-network theory, algorithm institutionalization theory, and social constructionist theory (Driessens et al., 2017). Accordingly, the dialogue to obtain artificial knowledge from self-learning and human knowledge is a cultural phenomenon and also used as a source of enrichment and inspiration theoretically and practically.

7.3. Modeling domain

AI journalism ontology is mainly made up of domain modeling and knowledge representation, both of which are shaped by journalistic and computational projections. Paying attention to these projections will lead to better entity description and quality architecture for more intelligent news automation systems.

7.3.1. Journalistic projection

Ryfe (2019) argues that the journalistic ontology challenged by de-professionalism, and projects the ontology from four key purposes: inform, explain, investigate, and affirm. Because of the technology applied in news detection, production, distribution and interaction, human journalists struggle to make a firm distinction between themselves and other news producers including bloggers, social media influencers, corporate communication offices and advocacy groups. This ontology proposed by Ryfe (2019) does not transcend the binary opposition assumption between human professional journalist and the self-alienating factors of mediatization and robotization (Mazzoleni, 2017; Shibata, 2018; Virgillito, 2017). The contradiction puts the journalist identity, news ethics and quality journalism in jeopardy.

Another study field is the functional simplification of journalistic ontology as an taxonomy to unravel the media structural relations. Focusing on the Knowledge Meta Process, Mellouli et al. (2010) propose an ontology for representing financial news, and structure the concepts of the domain contingent on the news content. Instead, Lupiani-Ruiz et al. (2011) classify financial news according to the domain knowledge of news beat (normally there are three domains: news, ontology and the news beat). While, journalism ontology is not only the taxonomy, but also the knowledge representation and cultural recognition.

The study regarding ontology as part of cultural processing is an active ontology research strand from journalism perspective. In mass communication, ontological issues deal with beliefs about the natural and social realities (Fink et al., 1996). Proper ontology building is instrumental in stable sense of reality called by Giddens (1991) “ontological

security", and helpful to ease the anxiety about the ostensibly incomprehensible. This reality is constructed by media and technology, as well as embodied by a sense of cultural continuity for emotional and cognitional generation of news criticisms, trust and identity. Journalism ontology should be re-envisioned as the combination of local ontology and the global statements (Ostertag, 2010), raising concerns over cultural dominance and empowerment.

7.3.2. Computational projection

The computational profile of AI journalism ontology is aimed to model and simulate human journalists' working routines and accelerate them to fit into the event-driven multimedia narrative (Caswell et al., 2018). The first step is to establish knowledge representation standards to overcome the limits of incompatibility of proprietary products. For the general knowledge, W3C[1] brings forward semantic web ontology stack, which includes Resource Description Framework (RDF)[2] that is insensitive to different underlying schemas when modeling data interchange, and the Web Ontology Language (OWL) for representing "rich and complex knowledge about things, groups of things, and relations between things"[3], etc.

Specifically in the news domain, the International Press Telecommunications Council (IPTC)[4] has developed News Industry Text Format (NITF)[5] and NewsML-G2 for news representation. "NITF is an XML standard designed to structure independent news articles. NewsML-G2, also an IPTC standard, is for the structuring of multimedia news packages."[6]

News Industry Text Format (NITF) is a proposed solution for sharing text news, using XML to define the content and structure of news articles. The news content is structured in the form of metadata in order to improve the adaptation of textual news to various bandwidth, devices, and personalized needs of news consumption in any formats, such as HTML, WML (for wireless devices), RTF (for printing).[7] NITF defines semantic units and delimits their boundaries by the tags "PERSON: personal names; FUNCTION: a person's position or role; ORG: an organisation name; LOCATION: a place name; EVENT: a news-relevant event; OBJECT.TITLE: the name of a news-relevant object; CHRON: a time

expression; MONEY: a monetary item; NUM: a numeral expression; Q, BQ: quoted information"[8] etc.

NewsML-G2 is designed to exchange news content among different media by offering the standard format so as to convert the content into metadata which is "a common framework for information about the content"[9]. It represents a journalistic routine model that contains five generic domains (Planning and Assignment, Information Gathering, Verification, Dissemination, and Archiving), and is founded on the News Architecture[10].

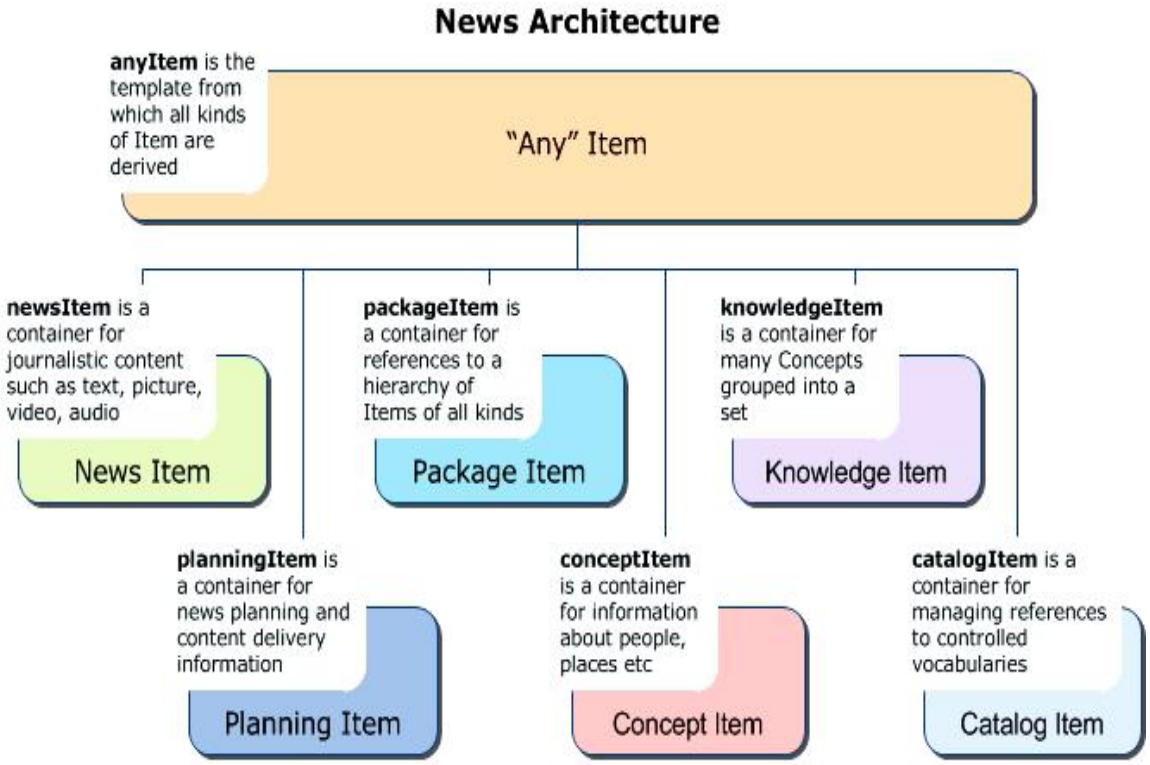

Figure 7.1 News Architecture of NewsML-G2. Reprinted from *NewsML-G2 Guidelines,* by IPTC NewsML-G2 Working Group, Retrieved May 5, 2020, from https://www.iptc.org/std/NewsML-G2/guidelines/#general-design

Apart from news content mark-up for knowledge representation, semantic based tools are also utilized for knowledge integration and process integration, both of which can be approached by axiom-based research involving "the identification of a set of axioms and their consequences to derive a logic-based computational model" (Damjanović et al., 2007). The axioms are convenient to be functionally simplified as basic reasoning techniques (Fernández et al., 2010). For instance, with regard to modeling cross-domain and embracing semantic heterogeneity and interoperability, Damjanović et al. (2007) design a cross-domain engineering ontology for mechatronics.

7.4. Entities and architecture

In a narrow sense, an ontology is represented as a furcate conceptual tree which is comprised of entities, attributes and instances, and formed in a relational architecture of axioms and rules (e.g. Mellouli et al., 2010). The entity that is perceived in the Object-Oriented Programming as a class can consist of subclasses which represent concepts subsumed under superclass. Entities are also real-world objects, events, situations or abstract concepts (Tolk, 2013). The attributes describe the characteristics of the class and modify the concepts. The exact knowledge constituents are the individual instances which are the reification of the class. From the perspectives of practices and functions, the following part succinctly discusses the entities and architecture of AI journalism.

Entity 1 ***Journalism***

The implication of journalism is multifaceted partly resulting from the significant roles of journalism in the media industry and business, public sphere, cultural and social construction (e.g. Aitamurto, 2018). In order to pragmatically dovetail with technological domain, the connotation of journalism can be functionally allude to five sets of theme:

"A. Current or recent events as subject matter.

B. Breadth of audience (which in turn implies a concern for accessible or engaging language and forms).

C. Attempted ascertainment of factual accuracy.

D. Independence (connoting an arms-length interest in publication itself versus direct benefit from the consequences of what is published).

E. Involves original work (as opposed to mere linking or replication).” (Shapiro, 2014)

Entity 2 ***Artificial Intelligence(AI)***

Bringsjord et al. (2018) take reference from Russell and Norvig (1995, 2002, 2009), and define AI in reliance on the varied understanding of the ultimate goal which falls into the following classification. Each of the four compartments is an angle for making the definition.

Table 7.1 Four definitions of AI. Reprinted from *The Stanford Encyclopedia of Philosophy Archive (Fall 2018 Edition), Edward N. Zalta (ed.),* by Bringsjord, Selmer; & Govindarajulu, Naveen Sundar, Retrieved May 5, 2020, from https://plato.stanford.edu/archives/fall2018/entries/artificial-intelligence/

	Human-Based	**Ideal Rationality**
Reasoning-Based	Systems that think like humans	Systems that think rationally
Behavior-Based	Systems that act like humans	Systems that act rationally

Entity 3 ***AI Journalism***

The combination and coexistence of AI, robotics, and journalism to automate the production of journalistic content. Therein, AI and robotics are the method of and aims at quality journalism, notwithstanding the backfire because of the uncertainty and immaturity

at present. The usual aliases are robot journalism, automated journalism, automatic journalism, and algorithmic journalism.

Entity 4 ***Automated Writing***

Defined by Dörr (2016) as "the (semi)-automated process of NLG by the selection of electronic data from private or public databases (input), the assignment of relevance of pre-selected or non-selected data characteristics, the processing and structuring of the relevant data-sets to a semantic structure (throughput), and the publishing of the final text on an online or offline platform with a certain reach (output)."

Entity 5 ***Descriptive Narrative***

Automated journalism capitalizes upon existing data and models to generate the narrative of "automated description" (Caswell et al., 2018). Particularly, the narrative is composed of templates with complex arrangements of logic and associated text fragments, and discrete hierarchical trees of conditional (ibid.).

Entity 6 ***Event-driven Narrative***

The AI news narrative with semantic units and event abstraction by modeling data for encoding coherent and complex journalistic storytelling. For instance, normally each news story contains the initiating event, consequence event and unusual event (Caswell et al., 2018).

Entity 7 ***Machine Learning***

Machine learning refers to the automated detection of meaningful patterns and novelties in data (Shalev-Shwartz et al., 2014), while focusing on the ability to learn and adapt models premised on data rather than explicit programming (Hurwitz et al., 2018). Before machine

learning, rules and instruction defined by humans are the resource. In machine learning, structured, unstructured and semi-structured data are resources.

Entity 8 ***Deep Learning / Neural Network***

Deep learning is "designed to emulate how the human brain works so computers can be trained to deal with abstractions and problems that are poorly defined." (Hurwitz et al., 2018) When there are multiple hidden layers in a neural network, it is often called deep learning. "A neural network consists of three or more layers: an input layer, one or many hidden layers, and an output layer." (Hurwitz et al., 2018). The feedforward deep network is a quintessential example of a deep learning model (Goodfellow et al., 2016).

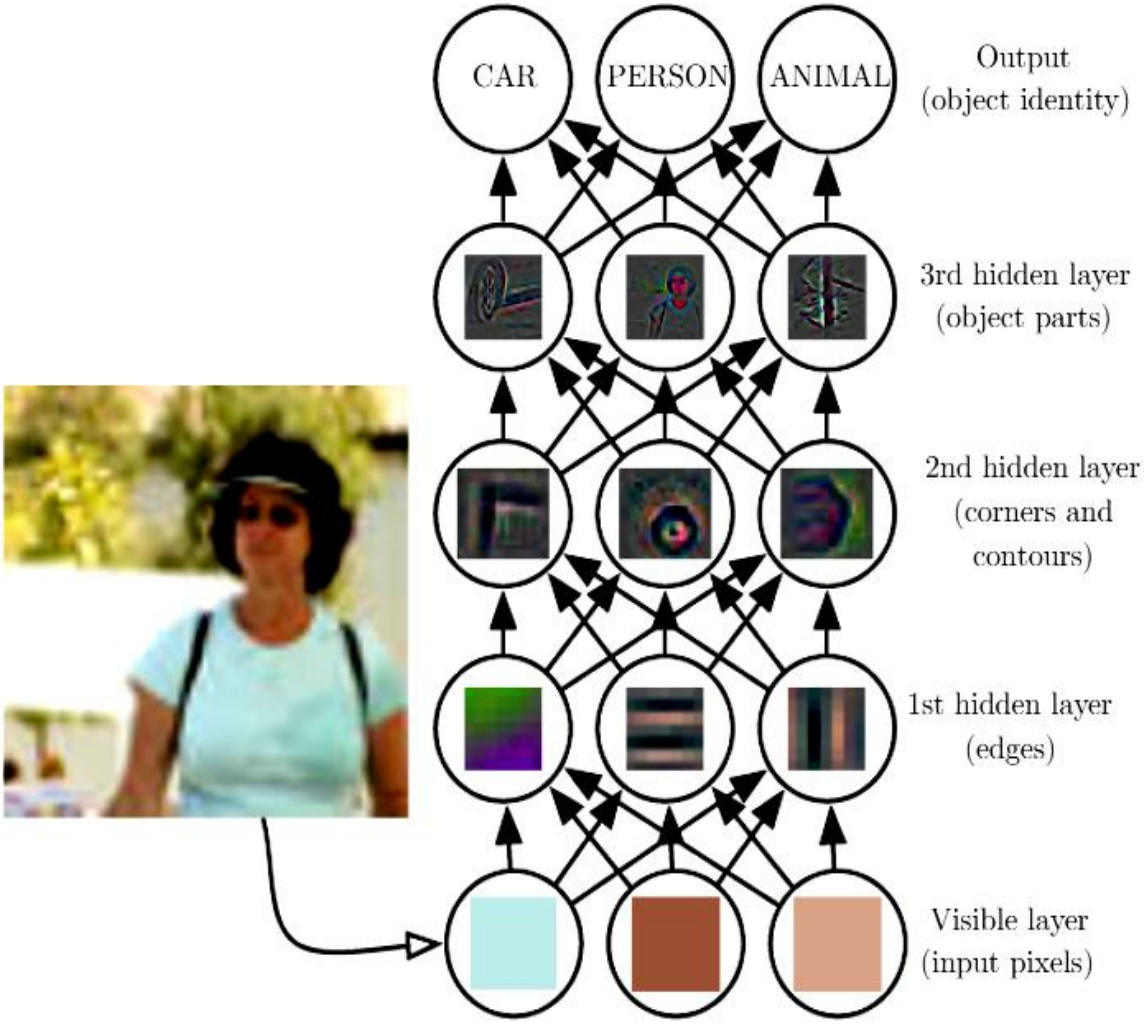

Figure 7.2 Illustration of a deep learning model of representing the concept of an image of a person. Reprinted from *Deep Learning: An MIT Press book,* by Goodfellow, I, Bengio, Y, & Courville, A., Retrieved January 22, 2020, from http://www.deeplearningbook.org/

Entity 9 ***Supervised Learning***

Supervised learning describes a scenario in which the training and/or developing databases contains significant information that is annotated by human (Shalev-Shwartz et al., 2014).

Entity 10 ***Unsupervised Learning***

Unsupervised learning describes a scenario in which the training and developing databases contains no intentionally human-annotated information (Shalev-Shwartz et al., 2014). Unsupervised learning algorithms use the unlabeled data to create and classify the parameter values by segmenting data into groups of examples (clusters) or groups of features (Hurwitz et al., 2018).

Entity 11 ***Reinforcement Learning/Reinforced Learning***

"Reinforcement learning is a behavioral learning model. The algorithm receives feedback from the analysis of the data so the user is guided to the best outcome." (Hurwitz et al., 2018) Furthermore, the reinforcement learning algorithms are required to predict more information for the test example through trial and error, which are being used in incredibly complex tasks such as self-driving cars (Shalev-Shwartz et al., 2014, Hurwitz et al., 2018).

Entity 12 ***Big Data***

"Big data is any kind of data source that has at least one of four shared characteristics, called the four Vs:
» Extremely large Volumes of data
» The ability to move that data at a high Velocity of speed
» An ever-expanding Variety of data sources
» Veracity so that data sources truly represent truth" (Hurwitz et al., 2018).

Entity 13 ***Data Mining***

Data mining is generally considered as extracting data from a larger data set (traditionally structured data) for the purposes of classification or prediction. Data mining tools are intended to show patterns that can be used by humans. By contrast, machine learning usually automates the whole process of identifying patterns, finding anomalies, and making descriptions and predictions for humans. (Hurwitz et al., 2018)

Entity 14 ***Natural Language Process(NLP)***

NLP means the course and capability of computers to capture the meaning of both written text and human speech. “Tools required for NLP include categorization, ontologies, tapping, catalogs, dictionaries, and language models.” (Hurwitz et al., 2018)

Entity 15 ***Named Entity Recognition(NER)***

Named entity recognition (NER) refers to “extracting named entities such as person, location, and organization names from documents.” (Wang, et al., 2019) To be specific, it means automatically analyzing and extracting major concepts, entities, events, etc. from normally a huge amount of data, and automatically annotating tags on news articles to provide clues to archive, search, generate content of related topics.

Hierarchical conceptual architecture of AI journalism

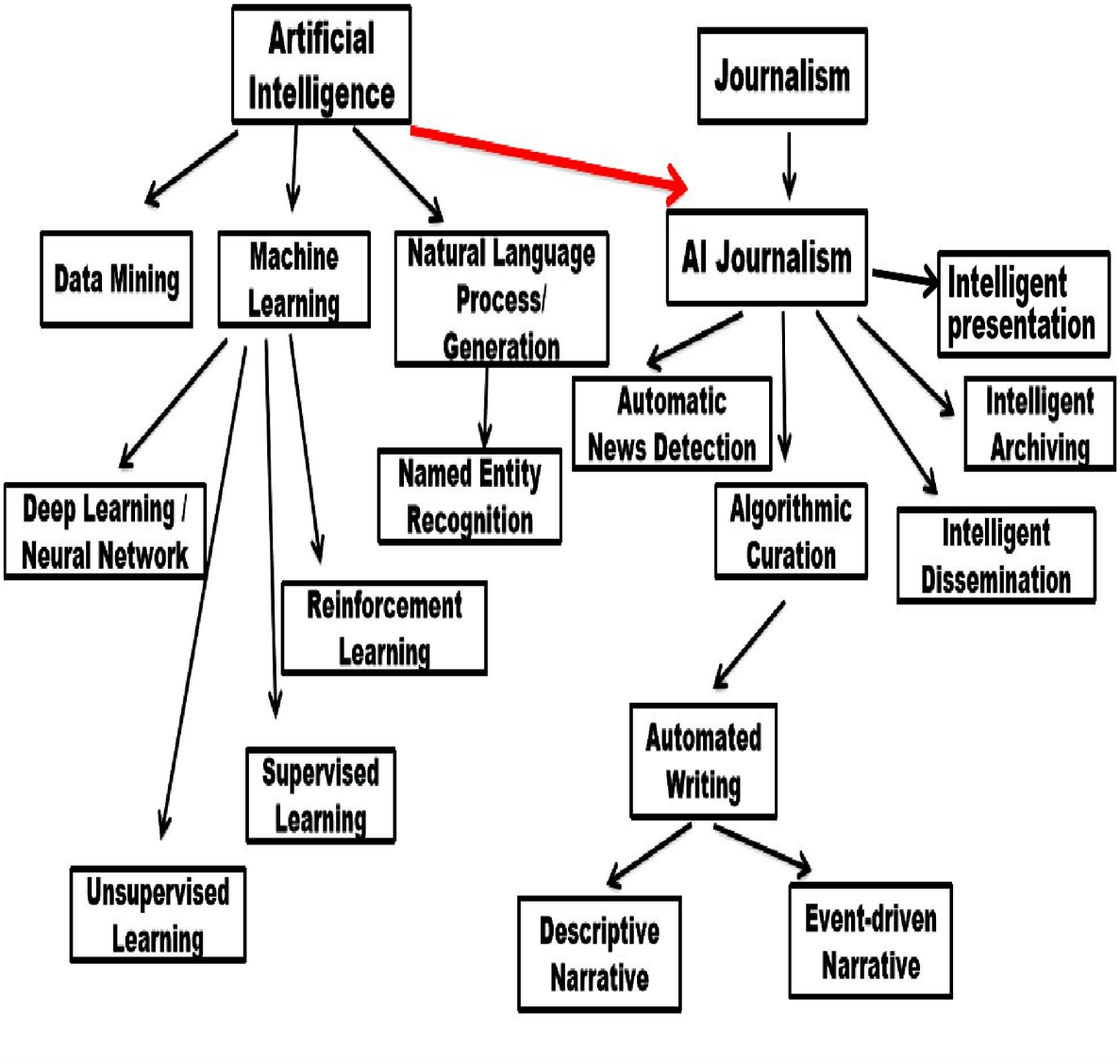

Figure 7.3 AI journalism architecture.[11] Source: Own elaboration.

7.5. Conclusions

AI journalism is the study and practices of interaction and hybridization of AI and human journalists in news ecosystem for quality journalism. It is ostensibly a trans-domain field and cross-domain knowledge that is in need of bridging the ontological discrepancy between different disciplinary comprehensions, particularly between computation and journalism. AI journalism ontology is hence fashioned in this study from journalistic and computational projections, for the purpose of transcending disciplinary barrier and boosting the development of AI journalism in favor of humanity.

We propose to build the ontology that can manifest the emerging phenomenon in news ecosystem where intelligent machines and human journalists are coexisting, AI journalism ontology should form the features of the intersection of knowledge models and the fuzzy logic; and pinpoint the capacities of auto-organizing knowledge, recognizing vagueness, keeping heuristic and dialogue. And in specific, the entities and architecture of AI journalism ontology are outlined.

Notes

1 https://www.w3.org
2 https://www.w3.org/RDF/
3 https://www.w3.org/OWL/
4 http://www.iptc.org
5 https://iptc.org/standards/nitf/
6 ibid.
7 ibid.
8 https://www.iptc.org/std/NITF/documentation/stx9804-NITFmarkupGuidelines.pdf
9 https://www.iptc.org/std/NewsML-G2/guidelines/#executive-summary
10 ibid.
11 This hierarchy is contextual, rather than categorical and exhaustive.

Chapter 8
Automated News Event Detection

With the uprising of machine learning, natural language processing (NLP), news event detection as a step of newsmaking is fairly related to artificial intelligence, and is an exemplar of AI journalism. There lies a common course between detection technology and news inherent properties, that is, finding the novelty from data(Snowsill et al., 2010) and in many cases big data, as machine learning is craving for structured, semi-sturctured and even unstructured data as resources, as well as news is pursuing audience's attention among a deluge of information. On the other hand, the intrinsic logic for the crossover between AI and news detection offers a possibility for the transcendence between computational and journalistic demarcations. Because they are, to a certain extent, contingent upon (a) the orientation of context, (b) the mediation for contact, (c) the institutionalization of algorithm.

The generally accepted patterns of news event detection include applying personalization (Chen and Liu, 2009), searching through social networks (Bandaragoda et al. 2017), and monitoring news environment (Ontrup et al., 2009). Although tested efficacious, these patterns of designing algorithms to do data mining are merely one approach of news detection by fitting into the predefined data web. Aside from novelty filtration, another cornerstone of automatic news detection is the semantic content construction which aims to make information structurally ready to search (e.g. Jones et al., 2019). Nevertheless, this poses challenges to human journalists, and highlights the necessity of developing the corresponding mindset.

8.1. Academic evolution

The literature analysis (q.v. appendix E) is conducted to find the academic evolution of news event detection. Firstly, news event detection is mainly realized through three general methods, namely log-based method, content-based method, and structure-based method. The log-based method capitalizes on web search logs (such as the searching record on Google) to discover events. The content-based method detects events through analyzing textual information by means of natural language processing. The structure-based method, which is also called link-based method, utilizes website structures, hyperlink structures and/or the structures of social contact to detect events.

Secondly, the academic trajectory of news detection evolves from single-factor detection (e.g. keywords) to multi-factor detection (e.g. the composition of locality, temporality, keywords, personalized user). Specifically, click-through event detection (Gu et al., 2010) is a log-based technique that incorporates link information, temporal information and query content. Lee et al. (2011) use topic mining by adopting and developing several algorithms, such as sliding window model algorithm, so as to figure out real-time topic from microblogs. Mention-anomaly-based detection (Guille et al., 2015) is a statistical approach that relies on dynamic links that users insert in tweets to detect significant events and evaluate the magnitude of impact over the community. Targeted-domain spatiotemporal event detection (Hua et al, 2016) is a semi-supervised technique which “first learns tweet labels from historical data, and then detects on-going events from real-time Twitter data streams” while considering spatiotemporal factors. Dashdorj et al. (2016) design a personalized event detection in social media, which models topics using a latent Dirichlet allocation (LDA) and personalizes events by different categories, users’ locations and dates. Four-dimensional event detection (Capdevila et al., 2017) employs a machine learning algorithm and probabilistic methods to detect event in location-based social networks, with respect to location dimension, time dimension, text dimension and user dimension.

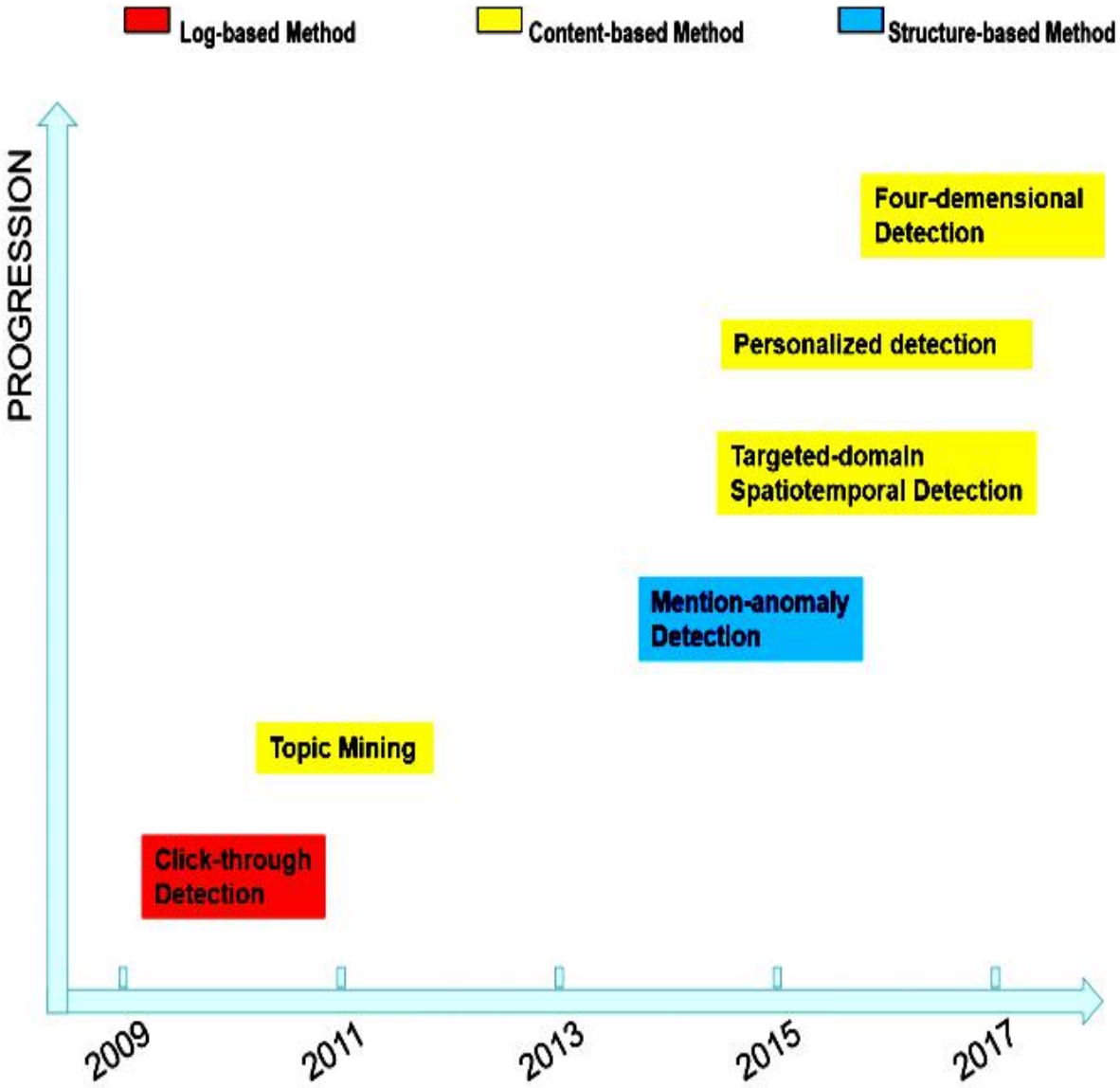

Figure 8.1 Academic trajectory of news event detection. Source: Own elaboration.

8.2. Environment detection

From the perspective of automated journalism ontology, the environment consists of physical spaces and the mediated information context, where various resources are in forms of World Wide Web, news articles, e-books, emails (Afsharizadeh et al., 2018), radios, videos, microblogs, emojis, newswire documents (Lam et al., 2001), to mention but a few. For instance, Chen et al. (2012) utilize a two-stage sequence classifier, i.e. vector machines and conditional random fields, to detect prosodic events from radio corpus**.** Astaras et al. (2017) draw upon foreground extraction method to detect latent news event from surveillance camera videos.

Microblog sphere is a prime environment for news detection (Guille et al., 2015). Bandaragoda et al. (2017) put forward an unsupervised incremental machine learning and event detection technique to deal with (a) the velocity, brevity and diversity of content; (b) the absence of structure and time-sensitivity during Twitter analysis. Furthermore, microblog sphere pe se can become the sub-environment and construct the internal milieu of virtual actuality. The study of Capdevila et al. (2018) show that machine learning techniques are able to retrospectively detect and institute the chronology of events from tweets. However, this may lead to the detachment from the factuality (Caveat 1: Vulnerability to fake news).

The generic process for environment detection follows these sequential steps: identification, retrieval, segmentation (clustering), prioritization, showcase. Dai et al. (2010) summarize that there exists a three-layer hierarchy (topic, event and story). And a news topic is comprised of a set of interconnected events which are constituted by a flat list of on-topic stories. Unfortunately, as the result of the high probability of similarity between two stories which belong to different events in a topic, to accurately identify events and topics may suffer from mutual confusion (Dai et al., 2010. Caveat 2: Different layers' confusion).

How to do segmentation? Vosoughi et al. (2016) outline the two conventional methods of hierarchical clustering. First, bottom-up approach: "each observation starts in its own cluster, and pairs of clusters are merged as one moves up the hierarchy." Second, top-down

approach: “all observations start in one cluster, and splits are performed recursively as one moves down the hierarchy.”

With regard to prioritization, the standard and weighing parameters are crucial. Luo et al. (2008) use interestingness as weight to evaluate the importance of news topics via multi-modal (i.e., visual, auditory, and textual) semantic items. Liang et al. (2010) identify Bursty Feature as “a word or phrase which exhibit an unusual high frequency over a finite time window.” Lee et al. (2011) propose Topic Energy as records for evaluating the extent of significance of a given topic at certain time.

8.3. Targeted mediation

Another research strand of AI-supported news detection focuses on precisely exploring novelty and anomaly through specified avenues which are normally mediated, including mass personalization and individual mediatization. To a single person, the news detection repertoire is normally a cohort of interfaces to big data. For the offering ends, detection system can simultaneously serve to a particular mass. For instance, Chen et al. (2009) broach a scheme considering both similarities and semantic relationships among news topics for personalized e-news tracking.

Hua et al. (2016) concentrate on targeted event tracking in Twitter and develop a system that “learns tweet labels from historical data, and then detects on-going events from real-time Twitter data streams”. The classifier for targeting often trained either from manually labeled or automatically labeled data is scarcely capable to exhaust all the possibilities in real environment. Normally, the classifier is solely customized by three dimensions, i.e. carrier’s feature (e.g. hashtag in Twitter), locality and temporality (Talukder et al., 2014). These may result in miss-targeting as well as inaccurate assertions due to the insufficient identifiable variants. (Caveat 3: Miss-targeting and erroneous judgement)

Investigative journalism can capitalize upon targeted mediation method to effectively automate working routines, detect novelties and valuable stories from targeted documents automatically. Ghosal et al. (2018) develop an event-specific crawling tool that scan and

single out worthy news documents across several domains periodically. Jain et al. (2018) demonstrate the feasibility of machine learning technique's application into investigative journalism to detect anomalies and extract useful insights in the given database of several government contracts in Colombia from year 2007 to 2012.

8.4. Algorithmic institution

Predicated upon AI's affordability and functionality, algorithm shows the tendency to integration into newsrooms pragmatically and institutionally (Dörr, 2016). Napoli (2014) argues that the political and cultural institution of media function is also applicable to algorithms. He breaks institutions into three components: the regulative, normative, and cultural-cognitive. Algorithm's influence on news institutionalization resides at its capacity to partly structure journalist and audience behaviors, impact opinions and sentiments, change news production routines. On the whole, algorithm operates as the infrastructure for primal level of organization.

Take semantic construction and organization of data as a case. Kallipolitis et al. (2012) create a system World News Finder to perform semantic search on the World News domain. They also provide the means to organize data, aiming to organically establish compatibility with semantic web, which is in the process of algorithmic modeling.

As for the detection of sentiments and opinions, Moreo et al. (2012) propose three reference parameters to evaluate words and sentences in opinion-expressing documents, i.e. subjectivity, polarity, and strength. (a) Subjectivity assesses to what extent the sentiment is expressed with subjective views. (b) Polarity is the extent to which the content expresses a positive or negative attitude. (c) Strength is the extent of polarity or intensity of the opinion.

Karthik et al. (2018) use deep learning to do opinion mining for sensing the pulse of the audience in a public action. Their main contribution to the field is taking into account of both texts and emojis in social media for opinion detection. In the system, emojis and texts are mined separately and then aggregated to analyse content polarity. Additionally, Krestel et al. (2010) use Latent Dirichlet Allocation and Support Vector Machine to automatically filter out what the intelligent machine considers unimportant news and detect ground

breaking new articles.

Thus, the gatekeeping is moving forward to the news detection step. And intelligent machine is empowered to judge and decide values and worthiness, with the excuse of algorithm's functionality of affording efficaciously institutionalization for better news detection, which put journalistic subjectivity and humanity at risk (Caveat 4: Algorithm dictation).

8.5. Mindset for semantic web

Other than the approach of searching newsworthy sources, the web constructive approach means changing and updating the ontology of web per se, so as to make the news events searching-friendly, which needs the combination between news archiving and semantic web technology. The web is evolving from web 1.0 to web 2.0, and shows the tendency to ubiquitous computing and semantic web both of which normally aims at semantically structurizing contextual information that is readable and interpretable to both humans and machines (Erfani et al., 2016). Meanwhile, the process of news producing is co-evolving from mass production, social production and automated production, to some extent. This trend is due to the common need of digital news production and big data for veracity, velocity, volume and variety (Hurwitz and Kirsch, 2018).

The semantic web for conceptualizing a domain "into a human understandable, machine-readable format consisting of entities, attributes, relationships, and axioms" (Chang et al., 2017) contributes to the spotlight in the academia for the promising application in topic detection and news alerts. Nonetheless, the gap between archivists' and journalists' mental models (García et al., 2008) and the discrepancy between disciplines of journalism and informatics may lead to the following challenges for human journalists: (1) How to undertake a smooth transition from current news management systems to semantic web systems, in order to cope with the new need in the news ecosystem where intelligent machines and human journalists can co-evolve. (2) How to imprint human logic into the logic of platforms and automation, in order to supervise the searching process and decrease the risk of either over-fitting in deep learning or algorithmic arbitrary decisions, even

hegemony.

Undoubtedly, these problems can not be resolved solely by human journalists. However, AI journalism, which connotes the automation of news event detection in question, is not only an exogenous sphere of exerting media logic, but also a retrospective dynamic of social and self construction. Thus, human journalists should adapt their mindset to better use news event detection system through semantic web.

8.5.1. The structured data oriented thinking

With the deluge of dynamic data and time invariant knowledge, it is critical to apprehend how to evolve, maintain, update and manage them. A human journalist, compared to robot journalist, is not capable of discerning every detail of the throughput of news detection, which is usually capsuled into the different layers of neural networks that are craving for semantically annotated data as the resource. As a result, a priori manual domain is requisite. And the foremost is embedding the thinking of structured data into journalistic working routines, with the purpose of stipulation of human logic.

Based upon event generation and representation (Rishes et al., 2013; Martin et al., 2018) in semantic web, data archiving and searching is generally a lossy process that simplifies news event into pure variants. For instance, the 4-tuple event representation {s, v, o, m} defined by Martin et al. (2018), “where v is a verb, s is the subject of the verb, o is the object of the verb, and m is the modifier.” Hence, filling the missing details necessary for the structured event is the duty of human journalist, which needs the abilities of (a) thinking news events in an abstract way, (b) fathoming out the schemes, rhetoric and coherent meanings of subtext and between lines, (c) optimizing structured data to make them compatible with automated event narrative parsing (Caswell and Dörr, 2018).

8.5.2. The ambient thinking

In view of NLP and event representation, narratives are socially interactive and situation dependent (Rishes et al., 2013). Detecting news event in semantic web is not only a procedure of searching stories but also a process of dissecting the contextual factors of story genesis, developing and ending. In this sense, human journalists should become more

coalesced into the ambience and contexts mentally and on the action, instead of only laying back before news detection devices.

This is also the demand of new communication ecosystem where journalism is becoming ambient (Hermida, 2010), on account of social networks and increasingly semantic data set. The side effect of this ambient journalism is the volatility of news models and environments. Therefore, the constant awareness system is given rise and "shifting journalism norms and practices" (Hermida, 2010). This awareness of ambience also denotes the internal consensus in the semantic ontology, such as the coherence of content description terminology and standard representation of searching principles (García et al. 2008).

Another reason for human journalist's ambient thinking is the complexity and nuances of context data, particularly when it comes to the emotions and societal conditions of the related subjects. And dealing with these context data for semantic news detection system also tends to be ambiguous, imprecise and erroneous (Erfani et al., 2016).

8.6. Conclusions

Generally, based on academic literature analysis, we find that (1) three prime methods are used to automatically detect news event, i.e. log-based method, content-Based method, and structure-based method; (2) news detection evolves from single-factor detection to multi-factor detection.

From the integration angle between event detection technologies and news inherent properties, automated news event detection to some extent depends on environment detection, targeted mediation, and algorithmic institution. In preparation for these, human journalists are in need of developing the mindset of structured data oriented thinking and the ambient thinking.

Chapter 9
Automated News Curation

9.1. Sociotechnical view

Artificial Intelligence (AI) and associated technologies applied into news production (e.g. Van et al., 2014; Hansen et al., 2017) impact on news ecosystem and societal domain. Automated news curation is a complex amalgamation of data availability, data and algorithm analyzing techniques, and data-driven critiques. And some scholars tend to view the complexion from a methodology of over-simplification and antagonism (e.g. Tatalovic, 2018). And the technological determinism makes a contribute, stressing the autonomy of technological change and the technological shaping of society (Galily, 2018). To a certain extent, it is fairly reasonable to acknowledge the social influence of automated news technology, particularly when it comes to egregious and meanwhile seemingly "minor" errors. For instance as early as 2008, United Airlines' stock price dropped dramatically after Google crawler's incorrect interpretation (Ananny, 2016).

In regard to technology, journalism is prone to be defined by digital methodology intervening the traditional working methods (e.g. Coddington, 2015), which is inclined to result in the confinement of functionalism and simplism in terms of news and societal practices. Hence, in order to find the harmony between AI and humanity in news curation, Lewis and Westlund (2015a) develop a sociotechnical emphasis on interconnections among actors, non-human actants, audiences and activities. They point out the research line which is overly underlining human centrality and the tension between humans and machines.

Against the backdrop of news ecosystem that is evolving with platformization (Helmond, 2015) and the coexistence between intelligent machines and journalists, automated curation is still in obscurity and opacity (Diakopoulos, 2015). As a result, there are two profiles to take cognizance of sociotechnical aspects of AI news curation. Firstly, deploying automation for automation's sake (Young et al., 2018), that is, meaning making

by way of structures, processes and practices, while upholding the "myth of interactivity" (Domingo, 2008) in data, algorithmic, social and cultural exchanges following open source news framework accompanied by proprietary pressure and presentational individuality (Deuze, 1999; Usher et al., 2012). Secondly, the consequentialism of automated news curation. With the purpose of functionality, the deontological nihilism is nurtured and shows the possibility of rising amid the disruptions to the authoritative news production (Lewis et al., 2015b). This is concerned with the urgency of theoretical and industrial institutionalization of norms and regulations (Napoli, 2014). And this is transferred the justice to inclusiveness and relevance of network, as well as appropriateness of timeframe (Ananny, 2016).

In order to find an approach to alleviate the stress between humans and news machines, and clarify the opacity in automated news curation. Based on the analysis of the latent turns from precision journalism as the background, this study proposes the methodology for automatically generating news, and discusses the application of linguistics into this domain, and finally summarizes the featured narratives for automated news curation.

9.2. Latent turns from precision journalism

Diachronically, automated news curation is apt to subordinate to data notwithstanding the disguise of professional editorial and journalistic values (cf. Splendore, 2016) and the rationalization by etymology of news automation. News automation inherits from the tradition of precision journalism which is active from the early 1960s (Anderson, 2018). The precision news production centers on reporting through the manner of social science and statistics, and gradually derives more methods and genres of news reporting involving using data to tell stories, i.e. computer assisted reporting (CAR), data journalism, computational journalism, etc. Yet, automated news production takes oblique turns from the precision journalism tradition. The turns are epitomized by directional duality of data and methodological conversion.

9.2.1. Directional duality of data

Some nomenclatures and categories of data and algorithm-related journalism are interchangeable in a practical and sporadic sense (Splendore, 2016). Although it is not yet determined, Anderson (2018) proposes an opposing data direction between data journalism and computational journalism from which angle to demarcate the boundary.

The direct purpose at the dawn of computational journalism is to "supplement the accountability function of journalism" (Flew et al., 2012) via integrating algorithms, data and social sciences. Conveniently, computational journalism semantically structurizes information and extracts syntactical items, such as acting subjects, actions and objects, from real life. It turns stories into databases in order to manipulate relations and correlations in the world of narration and semantic web (Anderson, 2018), built upon computer-assisted reporting (CAR) and science tools in journalism. Thus normally, the data flow is from reality through CAR and scientific tools to spreadsheets.

On the contrary, data journalism usually holds the belief that news can be represented by the structured information indicating the reality of properties, and that even the qualitative sources can be expressed in a numerical manner (Splendore, 2016). The default data flow is often from numbers and relations through data characteristics to properties, attributes and relevance of reality.

The difference between "computational" and "data" news curation should not be taken as contradiction but a continuity coupled with changes and innovations in a model of duality. The opposite data direction is not categorical but offering a perspective to the tendency of AI news curation reliant upon the tradition of data journalism and computational journalism, and leading to the duality. Journalistic working routines are immanently mixed with data analysis, programming, and visualization techniques (e.g. Splendore, 2016). Extraneously, journalism is under the strain of bridging the rifts when co-evolving with technology: professional expertise versus networked information, transparency versus opacity, active versus passive audience, big data versus targeted sampling (Coddington, 2015; Splendore, 2016).

It is the dialectical negation of opposing data flows that the directional duality of data

means in automated news curation. AI has been instrumental in driving forward this agenda of directional duality. In a narrow sense, by introducing AI into journalism, elucidating this duality is helpful to effectively make sense of complex data (what computational journalism often does) and quantitatively comprehend and attest convoluted reality (what data journalism often does).

9.2.2. Methodological conversion

In terms of precision journalism, technologies and tools are designed to cater to human journalists for the making of sense[1], and serve to extend and supplement rather than supplant human journalistic literacy (Flew et al., 2012). This methodology revolving around sense-making widely adopted by computational journalism and data journalism is established on the interplay of manual and computational modes of orientation and operation, and on the interplay of editorial and journalistic domain, business, and technologies in and beyond news organizations

Whereas concerning AI journalism[2], the strain from technological and algorithmic institutionalization (Napoli, 2014) is intenser, so that the confidence of being able to take control of news curation is increasingly baseless, since the automatic machines for news curation are becoming increasingly intelligent and yearning for entire automation and authority.

With automating the institutional routines and downplaying the constructive role of outside interference, automated news curation embodies and performs a more radical attitude against sense-making, accompanied by the possibility of self-alienation from actors and resources (such as human resources, over-fitted algorithms, and exclusive data), to a certain extent due to the complex and subtle contextual factors, i.e. public data availability, disorderly software scalability and myriad forms of engagements, which are progressively interconnected (Flew et al, 2012). Therefore, this sense-making methodology (Dervin et al., 2003) is not very adept at making sense of the paradoxes in AI curation for news.

The first paradox, enabling journalists to curate more news in shortened time while disabling them to understand and constructively participate the process[3];

The second, empowering journalism for more and wider niche audiences while depriving it from regarding audiences as living beings and social subjectivity[4].

We argue that these paradoxes to a certain degree are derived from the traditional sense-making methodology, which is for instance used in data visualization, and downplays AI's ability to fully subjectively make sense of news events. Compared to data journalism and computational journalism that can still be called human journalism or natural intelligence journalism on account of human's indispensability to add humanity and values to news curation, AI journalism becomes vital owing to the lack of human intervention, so that human journalists are not absolutely necessary to participate if they are not eager to.

As computational and data technologies are associated with the aim of examining principles and process via which to develop AI-narrated news, intelligent machines are pragmatically taken for granted as a type of existing that is independent of humanity. However, this is not suitable for AI journalism, on account of AI's exclusive and competitive edge over human resources in many facets and its potential of dispensing with complementary or supplementary actions (cf. Flew et al., 2012). The journalistic subjectivity is hence playing a role in the news generation, underscoring the thesis of the intersubjectivity of news actors (including audiences).

By reason that intersubjectivity draws forth the query into whether the subjective intelligence can be bestowed on news machines which are acting out as being intelligent, the journalistic methodology of AI news curation needs to admit the intersubjectivity of all news actants (Lewis et al., 2015a). This admission is a condition of solving competition between human journalists and robot journalists without recourse to absolute contradiction. And the ideal relation between human journalists and robot journalists in the future should

be “the mode of existence which articulates the ‘self’ with the identity of the other” (Freitas et al., 2017). First, the ideal relation recognizes machine subjectivity while believing this subjectivity should be delimited. Second, it encourages subjective diversity while upholding humanity. Third, it involves not only attributing mentality to others but also capability of swapping position with others (Diaz, 2018).

The methodological conversion should felicitously deal with the symbols, discourses and languages of journalism, computational science and communication science, as AI news curation stands astride the biological and computer-supported collaborative systems involved in experiences, descriptions and mimesis of the world (Diaz, 2018; Tomozei et al., 2010).

9.3. Methodology for automated news curation

9.3.1. Artificial language philosophy

While AI news curation is being converted from sense-making methodology, the problem appears to be how to know the very heart of AI news machines, and how to design and instruct news curation. We propose to introduce the theses of artificial language philosophy and genuine phenomenology.

In tandem with conventionalist view of language in concepts and reality, Lutz (2012) argues that the methodology of artificial language philosophy, i.e. developing languages for specific purposes, can clarify and justify the applications of artificial language philosophy which include automated news curation by means of reinterpretation. In respect of methodological usability, methodology of artificial language philosophy yields more convenient explanations than sense-making methodology in the domain of automated news curation, on account of technological and scientific connections such as Natural Language Process (NLP), Named-entity recognition (NER), Text-To-Speech (TTS), Automatic Speech Recognition (ASR), and depending on semantic and pragmatic concentrations such as meaning postulates and linguistic intuitions. In this domain, these two methodologies--sense-making methodology and artificial language methodology, even though probably neither exhaustive nor mutually exclusive, diverge and complement in

different contexts and narratives.

Artificial language philosophy exemplifies the dogma that "philosophical problems are best solved or dissolved through the conventional prescription of a new language, not by the analysis of actual language use" (Lutz, 2012), which tactfully circumvents the perplexing real contexts in which sense-making is always intractable, and is able to focus on trans-empirical and logic. For instance (Clark et al., 2010, p.65):

Every boy loves some girl who admires him

$$\forall x(\text{boy}(x) \rightarrow \exists y(\text{girl}(y) \wedge \text{admire}(y, x) \wedge \text{love}(x, y)))$$

And artificial languages are specifically designed and adapted to diverse contexts, in a bid to avoid problems by means of sustaining pragmatic advantages such as simplicity and precision (Lutz, 2012).

Taking Natural Language Generation as an example to explain the application of artificial language methodology, grammars can be inspected as generating sets of strings, and morphological analysis "as relation between natural language strings (the surface forms of words) and their internal structure (say, as sequences of morphemes)" (Clark et al., 2010), and sentences as derivation trees.

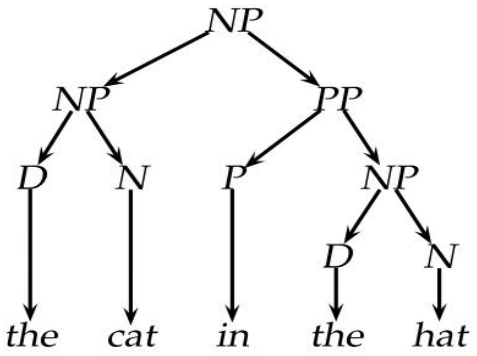

Figure 9.1 An example of derivation tree. Reprinted from *The handbook of computational linguistics and natural language processing* (p. 32), by Clark, A., Fox, C., & Lappin, S., 2010, John Wiley & Sons, Ltd.

Lutz (2012) demonstrates that derivations are based on meaning postulates and internal structures (also known as logic), both of which are invoked on the premise of conventions. As a result, the authenticity of derivations or sentences is provided by language convention and/or empirical research. On the other way around, without language convention, empirical results can only prove meaning postulates to be useless and inapplicable, rather than false. Thereby, if adopting this methodology, automated news curation as a system of linguistic choice and conceptual formation, is no longer restricted by prejudices and paradigms of propositional statement, but more productive and applicable for fuzzy logic and diversity.

9.3.2. Therapeutic approach

In terms of meaning postulates and internal structures, there is a cognitive fracture between artificial inner logic and worldly context. Thus, would the abstraction and purification of the news curation process from reality inevitably lead to inhumanity of journalism? In order to avoid that, this artificial language methodology should assimilate Husserl's theory explicating the question which is also put forward by phenomenologists as the "burning question" -- "meaning or meaninglessness of human existence" (Husserl 1970, p.6). For the answer, journalism as science, concomitant with computer science, communication science, needs further expounding. Derived from quantitative journalism and precision journalism, automated news curation is striving for legitimacy by possessing investigative (if not scientific) methods and technological (if not objective) attributes (e.g. Young et al., 2018), and committed to a more rational social order (Meyer, 1991).

Once moving forward to a more scientific stance, automated news curation just transfers legitimacy from social contexts to the scientific domain where however crisis lurks. As Plotka (2010) asserts, "the success of sciences is accompanied by the naïveté of human attitudes". To attack this, genuine phenomenology propounds the therapeutic approach which insists that science is therapeutic if it is conducive to philosophically "consider[ing] human life as a concrete and individual subjective being" (Płotka, 2010). In specific, the therapeutic science requires (1) the non-solipsistic attitude, (2) the focus on communicative relation between subjects, and (3) the consideration of life as being in statu

nascendi (Płotka, 2010). To fulfil these conditions, genuine phenomenology examines the "communal inquiry of time", since objective investigation is invariably a "stream of temperalization" (including retention, primal presentation and protention). In this stream, self-cognition and human freedom are being pursued through the implications of therapeutic science (Płotka, 2010) that claim to be both objective and subjectivity-concerning. In other words, only when a science enables the man see himself as an acting and questioning person it becomes therapeutic.

By construing phenomenological accounts of questioning about being therapeutic as methodology, with the aim of being an accountable process in AI journalism routines, (1) AI news curation should keep questioning objectively and introspectively as a subjectivity and for the subjectivity because questioning the questioned establishes itself (Płotka, 2010). Nonetheless in the contemporary reality of news curation, phenomenologically objective investigation normally concedes to objective description, which is not therapeutic. (2) AI news curation should reduce the presupposed recognition and so-called scientific positions both algorithmically and organizationally. Because the man "lives in the natural attitude" is often enslaved by presuppositions. Phenomenological method of reducing the presumption is to open "human being for the world and for the community permanently" (Plotka, 2010).

Actually, theoretically analyzing and applying the therapeutic approach into journalism can date back to the time when news automation has not developed as so intelligent. Joslyn-Scherer (1980) underlines that therapeutic journalism is a journalistic specialty for a particular special-interest group, which is in light of the interaction and relation between publications, consumers, professionals and community representatives to promote self-esteem of journalists and audiences, enhance community treatment and affiliation, and increase educational function of journalism.

The tradition of sense-making methodology and the recent adoption of artificial language philosophy and therapeutic approach instruct the practices of automated news narratives. The following part we will discuss how to define, discern and apprehend the application of linguistics to automated news curation and the classification of AI news narratives.

9.4. Application of linguistics to automated news curation

As early as 1950s, when Natural Language Processing (NLP) first touched on statistics and/or Machine Learning, the ambiguity, polysemy, and inflection of language are the difficulties for computers to process natural languages (e.g. Manning et al., 2000; Pustejovsky et al., 2013). And a conspicuous solution is to annotate corpora for analyzing and training the algorithms. The Brown corpus--one of the most widely known corpora--was generated in the 1960s and 1970s at Brown University. But at that time, the linguistics for NLP was mainly practiced as and for pure description or descriptive generation, rather than creative generation. And the research emphasized more on automatic annotation of corpora which is subsumed under corpus linguistics. Pustejovsky et al. (2013) attribute these inclinations to the unavailability of adequate data, which induces the introspective modeling of cognitive functions, because this model and formal methodology of linguistics are suitable for building and explaining rules that compose linguistic utterance and discourse.

On the other hand, the formalist models of cognitive linguistics are naturally associated with algorithms which are also dependent on rules that perform operations over inputs (Taylor, 2007). With the coming of big data and deep learning technology, it seems that rules are no more able and necessary to be defined beforehand to exhaust all the possibilities to instruct language processing, partly due to the heavy inflection of some languages and the limitedness of inventory units (semantic, phonological, and symbolic reflections) for construing knowledge language. This leads to the focus shift of Generative Grammar (Taylor, 2007) from input management (defining rules; e.g. Fodor, 1983) to output control (determining constraints) or at least the combination of input and output control.

To a certain degree, this shift represents the rising of autonomous linguistics which is subsumed under -- in most cases even substitutable with -- mainstream generative linguistics, and reflecting some features of the Chomskyan enterprise (Taylor, 2007). (a) Syntactocentrism. Syntax is comprehended as a computational mechanism that generates and constructs grammatical sentences and lexical materials. (b) Moduality. Syntax is often

encapsulated as independent and computational module from phonology and semantics, and specially cannot be explained in semantic terms and by cognitive capacities. (c) Extensive exposure to data. Even if not all the data need to be massive enough to act as a quantified corpus for linguistic analyzing and language process (Pustejovsky et al., 2013), the exposure to data needs to be extensive to cover the meanings and idiosyncratic behavior of individuality.

Based upon the assumption that meaning is independent of non-syntax perception, autonomous linguistics often exists as being antipathetic to cognitive linguistics which, by contrast, lays stress on construals, perspectives, foregrounding, metaphors and frames (Lee, 2001). These antagonism could resort to the polemic of "autonomy". Comparatively, this "autonomy", for autonomous linguistics(Mathieu, 2006), implies (a) the self-containing of syntax and grammar; (b) the separation between language competence (or language knowledge) and language performance (or language use). To put it another way, knowledge of language is not squarely derived from and informed by language use.

Nevertheless, "autonomy" is expediently assigned to generative grammar as self-structural independence (Geeraerts et al., 2010), such as the linguistic structures (e.g. syntax and morphology), which may not legitimate the external independence, for instance the independence of news ecosystem. To solve this concern, the debate converges on the one-to-one mapping between syntax and semantic, form and interpretation, position and function, structure and meaning. The explanation of this mapping, from the perspective of cognitive grammar, is the conventionalized association and the motivation from semantic structures (Geeraerts et al., 2010). Whereas, from the view of autonomous grammar, the implication of the mapping across two linguistic levels of representation (i.e. syntax and semantic) falls into the defeasibility of interpreting semantics, while upholding syntactical independence (e.g. Rizzi, 1990).

If the one-to-one mapping is established, it makes sense to automatically generate news in a way of not only relying on well-annotated corpora for description and generation, but also applying big data to connect contextual and linguistic factors. By virtue of this mapping, the application of computational news generation turns to the pragmatical

functions of both cognitive linguistics and autonomous linguistics. Therefore, the point turns to how to apply these functions to automate news generation in tandem with progression of linguistics.

Computational linguistics makes a foray into this field, and is divided into fundamentals[5], methods[6] and applications[7]. These methods and applications recursively act as tools for the one-to-one mapping that becomes the logical bedrock of news generation. Particularly, computational semantics and computational psycholinguistics render (a) formal analysis of meanings and (b) computational models of cognitive mechanisms and representations (Clark et al., 2010). As an exemplar, Pado et al. (2009) illustrate a SynSem-Integration structure which consists of the syntax model, semantic model and the interpolation. While the syntax model parses and ranks probability of inputs, the semantic model ranks the plausibility of the argument structure of verb. The two rankings are then interpolated into a general ranking to predict a humanly preferred structure.

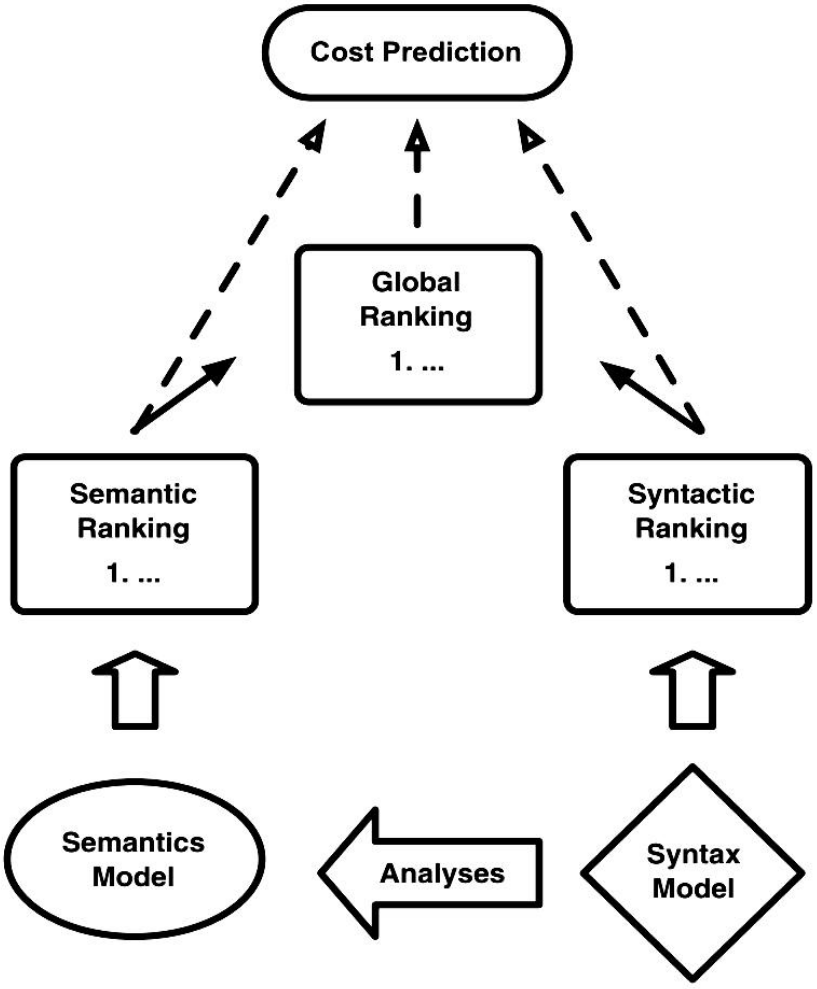

Figure 9.2 Architecture of SynSem-Intergration model. Reprinted from “A Probabilistic Model of Semantic Plausibility in Sentence Processing,” by Pado, U., Crocker, M. W., & Keller, F., 2009, *Cognitive Science*, 33(5), p. 808.

Yet computational linguistics does not seem adequate to explain news generation and embody news' public attribute, as the result of lacking perspective on public sphere, even if sticking to the sociotechnical view previously discussed. If computational linguistics is able to be comprehended and utilized as applied linguistics to automated news generation, it should adopt the criticism from the critical applied linguistics, considering the specificity of journalistic content. Compared to conventional disciplinary boundaries and classical linguistic perspectives, critical applied linguistics is a transgressive approach of applied linguistics by linking language issues to general social issues (Berns et al., 2006) that include fake news, information manipulation, strategic silence, low quality news, journalists' job security, etc. in journalistic context. Generally, it is devoted to the analysis and critique of "dominion (the contingent and contextual effects of power), disparity (inequality and the need for access), difference (engaging with diversity), and desire (understanding how identity and agency are related)." (Pennycook, 2006)

In relation to critical applied linguistics, automated news curation is the social process and interaction that participates in construction of meaning, knowledge and ideology, understanding of discourse in constituting the subject as multiple, conflictual and reflective, by dint of computational semantics, pragmatics, narratology, rhetorics, etc., while extending or adapting the theories of framing, priming, meaning manufacturing to the interlocking realities of AI, news and communication, where the mission or duty of making AI as tools is to enable and facilitate critical thinking for news generation. There is also a challenge about subjectivity and objective boundaries to draw. If AI is empowered or self-empowered to the extent of going beyond human control, taking charge of knowledge production, and at the speed of outpacing institutionalization of theories, policies and regulations, quality journalism is likely to suffer more uncertainties and disorientation, which should be considered as another factor apart from ideology, economy and political interests, from the perspective of the mixture of mediatization and disintermediation[8].

9.5. Classification of automated news narratives

9.5.1. Narratological perspective

In the theoretical practice of journalism, the demarcations between news narrative, storytelling, narrative structure, story structure and plot, etc, in many cases lack clear expression. Upon the coming of AI, it is more requisite to contour the boundary of automated news narrative in some aspects, such as theory background, linguistic expression, news values, AI narrative and AI narrating (narration), AI creativity. Practically, the related concepts are used interchangeably or at least by neglecting differences, such as narrative and storytelling, news literature and narrative news. Thus, it is instrumental in the delimitation to introduce narrative theory or narratology to news narrative studies.

Stemming from digital and multimedia storytelling, the news storytelling by AI, which we call AI storytelling, also adheres to the classical news structure, i.e. inverted pyramid, hourglass, diamond etc., while in need of more evident querying on the ineffectiveness of attracting wider audiences' recognition. To attack this ineffectiveness, Emde et al. (2016) advocate narrative news to enhance news comprehension, particularly for adolescents who are relatively deficient in issue knowledge, through eliciting stronger affective and cognitive involvement. Narrative news refers to the "non-fictional mediated information that follows the characteristics of stories in terms of structure, characters and plot." (ibid.) This returns to how to tell news stories or, more precisely, organize the narrative structure of news. Hence, news narrative studies need to adopt narrative theories, in another word -- narratology that is dedicated to the logic, principles, and practices of narrative representation (Hühn et al., 2009).

Narratology is the ensemble of theories of narratives, narrative texts[9] (including linguistic texts, audiovisual sign systems, etc.), spectacles, events; and cultural artifacts for telling stories (Bal, 2009). Conceptually, narratology is not necessarily simplified as a theoretical machinery "into which one inserts a text at one end and expects an adequate description to roll out at the other"(ibid.), but an intellectual tool for interpretive description (ibid.) and mediated/mediatized translation (Driessens et al., 2017).

News or news events are a kind of description of facts, in which the so-called objectivity is actually "a form of subjectivity in disguise" (Bal, 2009), although continuously emphasizing news values of being objective and balanced. This kind of fact description can resonate with the descriptive orientation of narratology. Description is a specialty of focalization[10] delimitated by narratology, and a textual or semiotic fragment in which features are ascribed to objects. Bal (2009) divides "description" into four elements, i.e. theme (the object described), sub-themes(components of the object), predicates of function or characteristic (e.g. "habitable", "large"). If description is metonymically termed, Bal (2009) summarizes six types of description. (1) The referential, encyclopaedic description (e.g. encyclopaedia). (2) The referential-rhetorical description (e.g. tourist guidebook). (3) The metaphoric metonymy. (4) The systematized metaphor. (5) The metonymic metaphor. (6) The series of metaphors.

Apart from understanding narrative as a form or process of description, narratologists also define narrative according to the interrelation of events, narrators, narratees. For example, Gerald Prince gives the following definition. "Narrative: The recounting [. . .] of one or more real or fictitious EVENTS communicated by one, two, or several (more or less overt) NARRATORS to one, two or several (more or less overt) NARRATEES." (Fludernik, 2009)

In relation to automated news narrative, the factors of narrative (i.e. events, narrators and narratees) need adapting to the turns of precision journalism and development of languages for news automation, as well as making comparisons of meanings before and in the automated news narration.

In automated news narrative, news events or facts are the multifarious sets of pure variants to mark attributes. For instance, the 4-tuple event representation {s, v, o, m} defined by Martin et al. (2018), "where v is a verb, s is the subject of the verb, o is the object of the verb, and m is the modifier." These sets are often structurally represented and added with news worthiness, i.e. proximity, significance, conflict, timeliness, the unusual, prominence, visual/aural emphasis, etc. There exist same core concepts as the bedrock of narrative theory between classical news narrative and automated news narrative, such as

Text/Narrative text (Bal, 2009), Narrator (Fludernik, 2009), Narratee (Fludernik, 2009), Narration/Narrative act, Narrative constitution (Hühn et al., 2009), Layers (levels, or tiers) of narrative (Hühn et al., 2009; Bal, 2009). For better interdisciplinary understanding, we summarize some of the core concepts.

Text (or narrative text)

Text (specifically narrative text) in narratology refers to the composition of signs in any medium or semiotic system, while laying stress upon the finite nature and structuredness of narratives, instead of linguistic style or linguistic nature (Bal, 2009). These signs range from linguistic units, video shots and sequences, audio clips, imagery, painted blots, buildings, the combination thereof, etc. The finite assemble of signs can generate tremendous amount of variations of meanings and functions (ibid.).

Narrator

The person or agent (including AI) that utters, writes the words or texts of the story. Narrators can be categorized into first-person (homodiegetic) narrators and third-person (heterodiegetic) narrators. Particularly, homodiegetic narrators are able to locate themselves on either extradiegetic or intradiegetic level. Intradiegetic narrators reproduce texts by conversational narrating. Heterodiegetic narrators normally plays the producer role of the narrative text (e.g. “Now, let us see what has been happening to poor Henry”). (Fludernik, 2009)

Narratee

A persona traceable in the narrative text functions as the object to the narrator, and represents the addresseehood. “A diegetic or intradiegetic narratee is a character in the fictional world to whom another character tells a story; an extradiegetic narratee is a reader persona exhorted, harangued or hailed by the narrator.” (Fludernik, 2009)

Narration (or narrative act)

In the narrow sense, narration or narrative act means the telling of stories by narrators to narratees. Broadly, it may also mean text telling/speaking, fabula constructing.

Narrative constitution

The composition, specifically the structural model, of narratives that have emerged in the tradition of formalism and structuralism. It stands for the multi-level structure of narrative, and underlines the transformation from the natural order of the narrated happenings to the artificial arrangement of the narrative (Hühn et al., 2009).

Layers (levels, or tiers) of narrative

The layers of narrative are derived from binary oppositions such as fabula/sujet, histoire/discours, and story/plot (Hühn et al., 2009), and develop into muti-level structures such as happenings/story/text of the story, story/narrative/narrating, happenings/story/narration/presentation of the narration. These layers are, in most cases by different narratologists, self-contained and contextual in light of different theoretical constructions (ibid.). For the operability, the three-layer model (text/story/fabula) is suitable to be appropriated into automated news narratives. The demarcation between text, story and fabula is not explicit, but functional in analyzing narrative structure. "Text" has been discussed above. And a story is a reflection and/or inflection of a fabula. A fabula is a sequence of events or happenings organized logically or chronologically (e.g. Bal, 2009).

Although classical news narrative and automated news narrative share core nomenclatures in view of narratology, the bifurcation of meanings might easily lead to some misunderstandings or confusions in academia about what should automated news narrative include, because of the conveniently interchangeable use of related notions, i.e. narrative by AI[11] and narrative of AI[12].

About narrative by AI, automated news narrative is generally construed by Latar (2018) as literally any news narrative using AI and associated technologies, and is represented by social media storytelling, chatbot storytelling, gamify storytelling, content-sharing storytelling, VR storytelling, drone storytelling, storytelling by telepresence robot, storytelling by software, etc. This delimitation of automated news narrative is likely to result in theoretical deficiency and divergence, and is usually not helpful to instruct the framework of automated narrative, instead of giving a panorama of the phenomenon and praxis.

Diakopoulos (2019) attempts to dwell more on the narrative of AI, notwithstanding lacking systematic exposition and narratological perspective, by means of integrating news narratives and subjectivity of AI, as well as hybridizing algorithms, automation and human journalists. It touches on, for instance, localized narrative and personal narrative.

In either case of narrative by or of AI, if it is possible to expound automated news from the viewpoint of narrative forms that differ from other kinds of discourse such as prose and conversations, the relation and interaction between AI, narrator and narratee should evolve with (1) the nurture of news values, e.g. the discourse and meaning construction of news worthiness (Bednarek et al., 2017); (2) characterization of automated news narrative, e.g. multimodality, scalability, timeliness; (3) technological development of AI consciousness, e.g. balancing between autonomy and creativity; and (4) philosophical examination of AI alterity (Freitas et al., 2017; Tomozei et al., 2010), e.g. balancing between humanity and AI subjectivity, since in this sense it is the AI news narrator who observes, evaluates and is evocative of actual experience of world.

9.5.2. Narrative genres

The narrative genre in question is deliberately differentiated from narrative artifacts[13] and narrative devices[14], from both of which various categories of narratives can be derived, such as parallel narrative and literary narrative. Regarding the applicability of news narratives as a consequence of balancing between literary realism and the fictions of the industrialized press (Underwood, 2008) and with the purpose of discussing narratives from the journalistic perspective, narrative genres are investigated based on nonfictional logic (Lovato, 2018) and technological availability, while aptly taking in dramatic structure.

News generated by AI are organized following specific procedures defined by self-learning and/or human supervision. From the angle of NLP/NLG (q.v. above discussions), these procedures are not explicitly demarcated from the algorithms which are capable of writing prose or poetry that are not normally considered as news. The judgement of making news rather than making fictional products is often cited as the ¨intentionality¨ of news making (Underwood, 2013) and the matched news industry norms, regulations and

cultures, notwithstanding the vague standards (ibid.) of epistemologically apprehending fact, truth or accuracy of stories.

The narratives[15] that are comparatively more discussed and capitalized on are the ones that can be easily organized through converting structured or semi-structured data (Hovy, et al., 2013) to narrative constitutions, including structured/semi-structured narrative, interactive narrative and immersive narrative (e.g. immersive journalism). But the ideal state of narrative genres, if ratifying the therapeutic approach, should also encompass community narrative and restorative narrative.

Structured or semi-structured narrative[16] is first applied into AI news generation partly due to its compatibility to different news ontologies with regard to technological aspect[17] (Zarri, 2009), atomising news (Jones, et al., 2019), semantic units of news and structured journalism (Caswell, 2019). But it tends to be too formulaic (sometimes too inflexible to require machine learning, e.g. Santos, 2016) and less creative compared to what news users anticipate although overall satisfactory (Melin, et al., 2018; cf. Graefe et al., 2018). To increase the creativity of news generation by AI, several methods have been theoretically proposed from different perspectives and disciplines, such as linguistic creativity from a cognitive perspective (Zawada, 2006), the flexibility or inflexibility of news (Jones, et al., 2019), organizing news in the event-driven form (Caswell et al., 2018).

In addition to structured/semi-structured narrative, the structurization of news emanates two other narratives, accordingly interactive narrative (storytelling through interaction between news users and algorithms)[18] and immersive narrative (storytelling by giving news users experiences of being in the news environment)[19], which structurize and process not only news content information but also interactive and environment information. The intelligence is represented through recording and adapting narrative constitutions according to the procedural data (generated through information exchange process), and integrating them into extant structured or semi-structured content data. To be specific, interactive narrative accentuates the interaction between different news actors (Landert, 2014), and treats journalistic circulation (Carlson, 2020) as part of narrative text

with the concomitant of news event content. Immersive narrative[20] is attuned to the experiential stories (Pavlik, 2019) that news users immersively experience[21] or mimetically live in the perceivable manners of sensationalization, visualization and simulation, including holographic projection, VR/AR/XR, etc.

However, news atomization and structurization only reflect artificial language methodology in the respective of developing language for automaton. To introduce and put into practice therapeutic approach, community narrative and restorative narrative should also be brought to the forefront, particularly for feature stories, upon which the creativity of automated news narratives can depend, since formulaic template models can be enriched by assimilating human-interest stories (Piazza et al., 2011) and cognitive perspective (Zawada, 2006). These two narratives are contributive to offsetting the over-emphasis of timeliness and scalibility of AI news generation, and can endow more humane factors, social responsibilities and constructive role of journalism (Aitamurto et al., 2018), e.g. constructive journalism (From et al., 2018) and conciliatory journalism (Hautakangas et al., 2018), notwithstanding that timeliness and scalability make it easier to serve for more communities in terms of human resources and sustainable local news business models[22].

Drawing upon AI and associated technologies, news curation has more methods (such as drones, mobile phones, portable devices) to remain connected to local news audiences and engage directly to communities. To some extent, community narrative is the product of strengthening the connection between news outlets and their audiences (McCollough, et al., 2017), by way of sharing narrative templates[23] within a community setting in order to pragmatically demonstrate textual politics and reflect power (Stapleton, et al., 2017).

Besides community narrative that underscores social and spacial aspects of news generation, the correlated narrative, i.e. restorative narrative[24], gives the prominence of recovery, restoration and resilience[25] to automated news narrative that balances the relation between immediacy of the breaking news, the capacity of accelerating news production routines and the nucleus of journalistic sustainability (Dahmen, 2019), especially in the wake of traumatic events or systemic dysfunction (ibid.) and in the report of emergent and

disastrous events, owing to the narration of the meaningful progress of news events and with the longer-term effects on both individuals and communities.

9.6. Conclusions

When taking into consideration of Artificial Intelligence's application into journalistic working routines, there exists AI malaise among journalists to some extent (e.g. Túñez-López et al., 2018). This study aims to clarify journalists´ misunderstanding on automated news curation, especially on the Natural Language Process/Generation, and to ease this AI malaise and instruct the journalistic activities with AI.

Automated news curation is a trans-domain concerning different domain knowledge, i.e. linguistics, narratology, computation and statistics, last but not least--communication and journalism. Although the studies on computational generation of news or texts started at least 1970s (Glahn, 1970), it is still in great need of theoretical framework and systemic construction from the perspective of journalism and communication while considering related disciplines. Thus, we have discussed the linguistic applications and narrative classification introduced in news curation, based on AI journalism´s latent turns from precision journalism. We admit that this study is not adequate to thoroughly methodologically alleviate the tension between humans and machines, and not sufficient to clarify the opacity in automated news curation, as the computational and statistic knowledge domain is barely discussed. But it proffers a framework to take the study further.

Notes

1 "Sense" is usually contextual. For example, local context is significant for concretizing news values (Thomas, 2016). And "context" is relative and predicated upon

the journalists' cognitive elaboration, through processes such as creation, comprehension, mental modelling and situated awareness (e.g. Dervin et al., 2003).

2 We emphasize AI journalism as an interaction between human and AI (associated technologies included) for quality journalism.

3 For instance, AI news production is rebuked for lacking "slow" qualities (Thomas, 2016).

4 For instance, audience is imbued with quantitative attributes and numerical manners (Koopman, 2019).

5 Computationally understanding of phonology, morphology, lexicography, syntax, semantics, discourse, pragmatics and dialogue, grammars, complexity, etc., in natural languages.

6 Maximum entropy models, text segmentation, part-of-speech tagging, parsing, word-sense disambiguation, anaphora resolution, natural language processing/understanding, speech recognition, text-to-speech synthesis, finite-state technology, lexical knowledge acquisition, corpus linguistics, linguistic annotation, etc.

7 Natural language generation, machine translation, information retrieval, information extraction, text summarization, discourse processing, question answering, etc.

8 http://www.gabinetecomunicacionyeducacion.com/es/noticias/el-clamor-general-por-un-periodismo-de-calidad

9 "A narrative text is a text in which an agent or subject conveys to an addressee ('tells' the reader) a story in a particular medium, such as language, imagery, sound, buildings, or a combination thereof." (Bal, 2009)

10 Various labels of the concept in narratology include narrative point of view, narrative perspective, narrative situation, narrative viewpoint, narrative manner (Bal, 2009).

11 The narrative in which AI is integrated merely as a tool.

12 The narrative in which AI plays as a narrator or partial narrator.

13 For instance, narrative-centric, narrative-parallel, narrative-additive.

14 Such as metaphors, similes, personification, imagery, hyperbole, alliteration.

15 For example, the narratives crafted by the off-the-shelf products. See TABLEAU (https://www.tableau.com/products/trial), DANTE (https://www.base-h.com/website/writer.html), Xinhua News Agency' automatic platform MAGIC that edited football match videos in almost real-time (http://www.xinhuanet.com/sports/2018-07/07/c_1123093152.htm).

16 Dissecting narratives into their component parts in order to establish their functions.

17 For example, Narrative Knowledge Representation Language.

18 This narrative is common in the storytelling using social bots (Lokot, et al., 2015), transmedia storytelling (Gambarato et al., 2018), and closely related to participatory journalism (Saridou et al., 2018).

19 Being immersive means not only consuming news by 360° Videos, VR/AR etc. , but also the link construction between news users, news items and general contexts (Cayla-Irigoyen, et al., 2010).

20 A case is the New York Times report: One Building, One Bomb: How Assad Gassed His Own People.
https://www.nytimes.com/interactive/2018/06/25/world/middleeast/syria-chemical-attack-douma.html
Anther case, the Economist project: Future of Food. https://youtu.be/dd4iiVsHPA8

21 For instance, craft immersive narrative via the subjective camera, and camera's location and soundtrack collection at viewer's eye level.

22 For instance, Google News Initiative: reinventing community-focused journalism. https://newsinitiative.withgoogle.com/dnifund/dni-projects/reinventing-community-focused-journalism/

23 An explanation of underlying regularities in how collective memories/accounts are structured and expressed (Stapleton et al., 2017).

24 Telling authentic stories that (a) bring communities together, inspire hope, and reveal healing; (b) is strength-based with hard truths that show progression without giving false hope; and (c) keep sustained inquiries that present universal truths and human connection. (Dahmen, 2016)

25
https://www.poynter.org/reporting-editing/2015/whats-restorative-narrative-a-qa-with-a-journalism- professor-whos-studying-it/

Chapter 10
Intelligent News Distribution

10.1. News distribution and AI

If news distribution can be featured as social connection between news producers and news users by conveying information from journalists who have the information to whom would like to have it while do not (Waugh, 1995), in the aspects of geology and psychology, it is the distributive process and interaction between different news participants that are intertwined as essential part of interpersonal communication and other forms of communication (such as mass communication, targeted communication). The forms of social connectivity is changing with technological updating of information distribution, from newspaper delivery boys' bikes to railways (e.g. Smits, 2016), from telegraphs, RSS, social platforms to AI and associated technologies, and to name a few. What has never changed is the ostensible purpose of news delivery or distribution, namely keeping news users closer, psychologically and/or geographically, to information conveyed by different forms of carriers including newspapers, TV, Twitters, WeChat, TikTok, TouTiao , YangShiPin[1] and AI-synthesized news anchors and among others. And the influence of the information is the secondary aim, which can be pondered under the umbrella of news manipulation, political communication, propaganda, socialization, etc.

From this point of view, news users are at the epicenter of the intelligent distribution of news. The behaviour of news consumption is diverse and changing with the rhythm of news platform developing. According to the report about news consumption in China[2], smartphones were the most popular terminals for respondents to read news, accounting for 99.82%. The news that respondents consume are 75.25% from WeChat group, 39.02% from TikTok, 26.61% from TouTiao, 20.03% from Weibo, while only 0.68% from print media, 6.56% from TV and 4.24% from other sources. As reported by Pew Research Center[3],

about two-thirds of U.S. adults (68%) access news through such digital platforms as Facebook, YouTube, Twitter, Instagram, LinkedIn, Snapchat, Reddit. On the contrast, almost this same amount of news users (62%) are wary of social media sites[4] in terms of social media's over-control of news distribution, and more than half of news users think that social media bots[5] are primarily used for malicious purposes, both of which bring about new challenges for accurate, impartial and transparent journalism (Aitamurto et al., 2019). Meanwhile, two-thirds of news users are also concerning about the little affect[6] of understanding current events from accessing news by social media or digital platforms in question. As AI is more integrating and participating in news delivery, these concerns deserve more attention, such as whether AI is maliciously used and is accompanied with artificial unintelligence (Broussard, 2018).

General meaning of AI in journalism industry (e.g. Beckett, 2019) is a system of technologies, protocols, contracts and algorithms to intelligently automate human tasks, including semantic web services, blockchain, machine learning etc. This automation influences the flow of news distribution, which is manifested by the relations of news with (1) physical medium (e.g. paper, foldable screen, louderspeaker, ebook reader, drone, bot/robot); (2) media and news organizations (e.g. radio broadcast, public TV news, news websites, social platforms); (3) the public and news users (e.g. demographics, preference, emotion, temporality, locality). Then the questions fall to how to find the advantages of AI and make full use of it to disentangle these three relations, and how to effectively integrate AI into news distribution to avoid the hindrance or dysfunction of AI as much as possible.

We need to apprehend intelligent news distribution through the lens of news forms and theoretical models, distributive structures and interactive dynamics to explain the power of AI to reform the information distribution paradigm in the news ecosystem where news distribution is not only a kind of information connection between information distributor, user and carrier, but also a status conversion of information flow between them from directive (e.g. legacy media, traditional bulletins) to bidirectional (e.g. social media, UGC) to stereo-spatial (e.g. AI media, Virtual Reality/Experience Reality) in light of the technology empowerment to itself and to audiences which creates tension between human

journalists and robot journalists. AI and associated technologies normally refer to machine learning/deep learning, computational automation/data processing, 5G/6G, VR/AR, 4K/8K, Internet of Things/intelligent wearables etc, and they are often capable of creating accumulative effect to keep news users closer in reality or in virtual reality to publications and news content which are customized, regardless of restrictions from time, space and social connections (e.g. Jingdong Experience Center[7]).

Intelligent news distribution[8] is the epitome of spreading news with the intelligent performance (such as news delivery by bots and robots) in the following aspects:

(1) Round-the-clock distribution and monitoring. Being compatible to existing mass distribution (e.g. broadcast and webcast) and social network, minimizing the interruption and restriction from human factor and technical interference, and non-stop surveillance of every steps of information flow. Creating engaging experiences, feedback loops and monitored information reverberation that help to understand the dynamics of news users, news content, human journalists working routines and news events. Particularly, feedback loops mainly consist of pre-exposure (news selection), exposure[9] (news processing), post-exposure (cognitive and attitudinal changes) (Lee et al, 2017).

(2) Acting interactively and communicatively. Intelligent news distribution is very comfortable and understandable for news users, so that news access is shaped by the routine interaction and news distribution is treated in conversational information exchanges by verbal and feeling expressions, thinking, habit, history, emotion and attitude (e.g. Sanchez et al., 2017), drawing on the experience of verbal communication and non-verbal communication.

(3) Customization and flexibility. With the flexibility of integrating data from different sources, of adapting to customized context, the gap of news values or news worthiness between human journalists and news users (Boczkowski et al., 2013) gains the potential to be narrowed. AI constantly learns, adapts and is customized to what journalists produce and what they intend to deliver. Meanwhile on the users' end, AI attempts to analyse and model news consuming behaviour so as to predict exactly who is most likely to find specific news interesting and distribute it straight to them.

The above traits of intelligent news distribution are concretely evinced by forms of personalization and personification with adaptation and constant feedback, and are normally resonated by syncretic forms of these, in order to make full use of and explore the potential and the trend of AI information distribution.

10.2. Immersive personalization

Landert (2014) defines personalization as the foregrounding of persons, whose concept underscores the subjectivity of persons or the active role of journalists and news users. This definition is forthright as the study focuses on mass media communication, which undergoes a dualism of massification and personalization, specifically "how personalisation is realised on online news sites" (Landert, 2014). Considering the active role of AI, personalization should also be interpreted by acknowledging AI as an entity (q.v. chapter 9, intersubjectivity). From this sense, AI news personalization is supposed to foreground the customization and high presence of four entities in media publications: news actors -- "i.e. individuals appearing in the news, such as decision makers, witnesses and individuals who are directly affected by a news event" (Landert, 2014); news users -- "this means that the audience is personalised" (ibid.); content/text producers (the meaning of text, q.v. section 9.5.1) -- journalists, correspondents, and news organizations; AI intermediary and associated technologies (such as Head Mounted Display) -- robot journalists, bots, social bots, virtual reality, augmented reality, experience reality. Normally, these entities play mutually rather than exclusively for strong personalization in the same text or context linguistically and in reality.

Thus, the context has the possibility and tendency to be immersive for news users so as to form an environment integrating different entities. The context has already exceeded the connection by customized news recommendations using notification on a lock screen, it includes different entities working and living environments and the task they want to proceed in a more granular, dynamic and flexible way. The immersive property, which can also be indicated as *immersion*[10], is often used in news narrating[11]. But it is naturally convenient to adopt this property into news distributive personalization[12]. For instance, the

location-based VR/AR/Experience Reality content distribution by the New York Times on the Ramones[13]. Another case, Meira et al. (2016) propose an interactive annotation technique for 360° videos that can annotate content to immersive videos by providing a different annotation paradigm and a set of tools. Their design sheds light on the potential and opportunities of linking 360° videos annotation with customized localities.

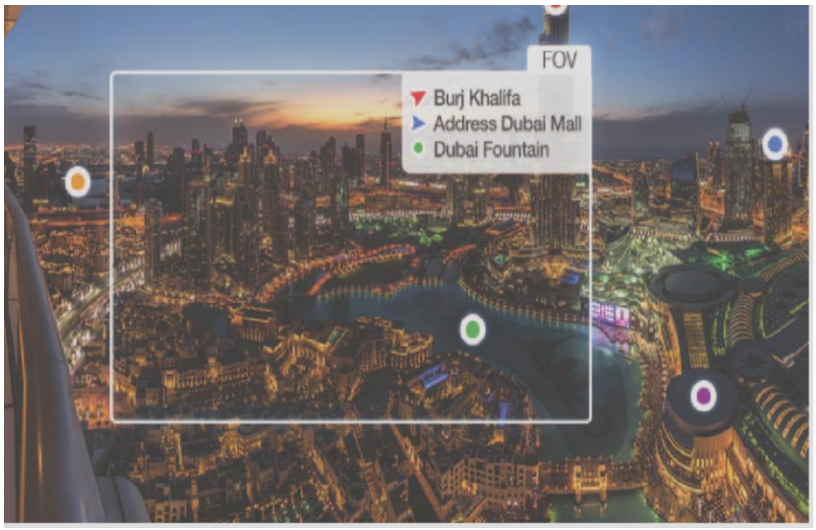

Figure 10.1 360° videos annotation to present all the relevant locations.[14] Reprinted from "Video annotation for immersive journalism using masking techniques," by Meira, J. et al., 2016, *23rd Portuguese Meeting on Computer Graphics and Interaction (EPCGI)*.

This *immersion* also embodies being sensitive and self-adaptive to new user's sentiments (Peñafiel et al., 2019) and ambience, and being more ergonomical compared to personalization before AI applied into journalism. For instance, news distribution system is normally able to collect and evaluate users' emotion and other subliminal reactions,

geospatial information, historical data and behaviors, etc. to enhance distribution service by anticipating and meeting news users' needs.

10.3. Interactive personification

Newsbots (the bots that applied in and for news routines and are in the form of chatbots, social bots, etc.) are mediating journalists and audiences interaction when it comes to news distribution (Ford et al., 2019). For instance, Jones et al. (2019) summarize the newsbot genres used by BBC, and discuss the potential of newsbots to be mobilized as vehicles to test out novel forms of personalization and two-way interaction in conversational format and tone, which reflects on the features of conversational journalism, i.e. social presence, friendliness, informality, coorientation/homophily, interactivity (Marchionni, 2013,2015).

Table 10.1 Cases of BBC newsbots. Reprinted from "Public Service Chatbots: Automating Conversation with BBC News," by Jones, B., & Jones, R., 2019, *Digital Journalism*, p. 9.

	Platform (BBC Online, Social Media, Messenger)	News Function (All forms of distribution)
Newsbot	BBC Online	A chatbot placed at the end of select online articles that followed a multiple-choice question and answer format using pre-scripted material.
Mundo Bot	Social/Messenger *(Facebook)*	Subscription service. Automated push updates twice daily, linking to BBC Spanish language news site, BBC Mundo. Manual push of breaking news to subscribers.
Quiz Bot	Social/Messenger (*Facebook)*	A quiz chatbot run on Facebook and in an online article using pre-scripted material.
UK Election Bot 2015	Social *(Twitter)*	Allowed users to give the first half of their postcode in order to provide the closest matching constituency result and a link to information on the BBC website.
EU Ref Bot 2016	Social *(Twitter)*	Tweeted out EU Referendum results for each counting area by gathering results in real-time from BBC in-house system and combining with TV graphics.
US Election Bot 2016	Social *(Twitter)*	As above but adapted for the 2016 US Election (also tweeted in Spanish).
UK Election Bot 2017	Social *(Twitter)*	As above but adapted for the 2017 UK Election.
BBC Uzbek Bot	Messenger (*Telegram)*	Subscription service. Uses existing RSS feeds to send latest headlines/summaries/entire articles in a private message as a way to get news into a country where the BBC is blocked.

With human journalists' preset conversational formats and/or automated generation by algorithms, these bots tend to express specific "journalistic personas" or personality traits in order to forge a relationship that is natural, informal and intimate with audiences (ibid.). Based upon AI, news distribution by newsbots can be classified into a form of personification that is justified through mobile mediality and platform-based sociality (q.v. chapter 3). Normally, personification (also known as prosopopoeia) is the rhetorical figure by which "something not human is given a human identity" (Melion et al, 2016); the communication device by which the process of embodying meaning and emotion is manifested; the operation in multiple registers[15] including sensory and spiritual, visible and invisible, concrete and abstract; and the modi operandi of dealing with facts, opinions and beliefs that are objectified by institutionalization[16] (ibid). Although personification is often applied in the sense of discourse and linguistics, the concept "anthropomorphism", which "refers to ascribing human like properties, characteristics, or mental states to nonhuman agents and objects" (Pradhan et al., 2019; Epley et al, 2007), is usually used interchangeably with the term "personification". Specifically and operationally, an approach to personification of newsbots in news distribution is prosopopoeic discourse and conversational interaction. In other words, it is a kind of interactive distribution through conversation. And Jung et al. (2019) find that the participants in their experiment preferred to access news by interactive conversation compared to news briefings.

Jones et al. (2019) define chatbot as "part of a wider group of Conversational User Interfaces (CUIs), which mimic everyday human dialogue in the form of a conversation, usually by employing informal and friendly language." Thus, the interface plays a great role in the personification that can be embodied by the format of news content (normally audio, texts, videos and pictures and the combination of these) and the presentation of news content (screens, voice speakers, robots, hologram etc.). The intelligent interface tends to be more sensitive to audiences´ contextual, sensory and emotional needs (e.g. Nuruzzaman et al., 2018; Jung et al., 2019). As deep learning increasingly plays as a generative-based model in chatbot design and developing, Nuruzzaman et al. (2018) divide chatbot application into four categories, i.e. goal-based, knowledge-based, service-based and response generated-based.

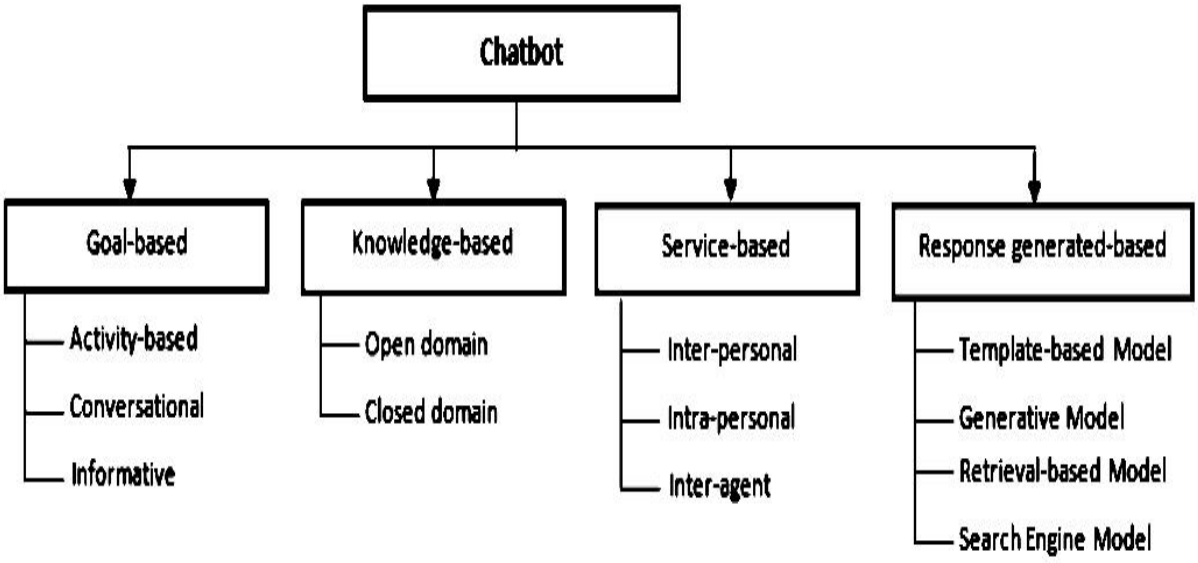

Figure 10.2 Taxonomy of chatbot application. Reprinted from "A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Networks," by Nuruzzaman, M., & Hussain, O. K., 2018, *Proceedings - 2018 IEEE 15th International Conference on E-Business Engineering, ICEBE 2018*.

According to the taxonomy, it is apparent that AI news distribution could be a form of conversation and respondence to what users need (goals, knowledge, service and responds). While, more intelligent of chatbots appear, more contributive to set the restriction and boundaries of interactive personification seems. The question falls to how to design newsbots of better interaction between personal assistants of news distribution and news users in the process of content exchange.

To solve this question, the role of chatbots or the combination of algorithmic and physical platforms that Pradhan et al. (2019) call voice-based conversational agents needs to be clarified first. Stated differently, can the platform mediate platform-based sociality as a solo intermediary or a social companion? Taking into consideration of

computer-supported cooperative work (CSCW) and the experiment that investigates "participants ranged in age from 65 to 83 and were required to have no prior experience using voice assistants (e.g., Alexa, Siri, Cortana)" by Pradhan et al. (2019), participants in question tend to subjectively personify or objectify voice assistants regardless of the voice assistant's persona that designers purposefully to create, depending upon the news users' desire for social contact and affiliation, physical location of the voice assistant and its embeddedness in the environment (e.g. home, office). Thus, the ontological categorization of chatbots by news users is subjective to a certain extent. As a consequence, the parameters of defining effective chatbots to fulfil news users' needs are also dependent on different users. But generally, chatbots can be benchmarked by the categories: personification, social intelligence, and conversational intelligence (Chaves, et al., 2018). And above all, the information quality and emotional connection are crucial factors especially for political campaign reporting (Gonzales, et al., 2017).

Table 10.2 Social characteristics of chatbots. Reprinted from "How should my chatbot interact? A survey on human-chatbot interaction design," by Chaves, A. P., & Gerosa, M. A., 2018, Retrieved May 5, 2020, from https://arxiv.org/pdf/1904.02743.pdf

	Social Characteristics	Benefits	Challenges	Strategies
Conversational Intelligence	Proactivity	[B1] to provide additional information [B2] to inspire users and to keep the conversation alive [B3] to recover from a failure [B4] to improve conversation productivity [B5] to guide and engage users	[C1] timing and relevance [C2] privacy [C3] users' perception of being controlled	[S1] to leverage conversational context [S2] to select a topic randomly
	Conscientiousness	[B1] to keep the conversation on track [B2] to demonstrate understanding [B3] to hold a continuous conversation	[C1] to handle task complexity [C2] to harden the conversation [C3] to keep the user aware of the chatbot's context	[S1] conversational flow [S2] visual elements [S3] confirmation messages
	Communicability	[B1] to unveil functionalities [B2] to manage the users' expectations	[C1] to provide business integration [C2] to keep visual elements consistent with textual inputs	[S1] to clarify the purpose of the chatbot [S2] to advertise the functionality and suggest the next step [S3] to provide a help functionality
Social Intelligence	Damage control	[B1] to appropriately respond to harassment [B2] to deal with testing [B3] to deal with lack of knowledge	[C1] to deal with unfriendly users [C2] to identify abusive utterances [C3] to balance emotional reactions	[S1] emotional reactions [S2] authoritative reactions [S3] to ignore the user's utterance and change the topic [S4] *conscientiousness* and *communicability* [S5] to predict users' satisfaction
	Thoroughness	[B1] to adapt the language dynamically [B2] to exhibit believable behavior	[C1] to decide on how much to talk [C2] to be consistent	Not identified
	Manners	[B1] to increase human-likeness	[C1] to deal with face-threatening acts [C2] to end a conversation gracefully	[S1] to engage in small talk [S2] to adhere turn-taking protocols
	Moral agency	[B1] to avoid stereotyping [B2] to enrich interpersonal relationships	[C1] to avoid alienation [C2] to build unbiased training data and algorithms	Not identified
	Emotional intelligence	[B1] to enrich interpersonal relationships [B2] to increase engagement [B3] to increase believability	[C1] to regulate affective reactions	[S1] to use social-emotional utterances [S2] to manifest *conscientiousness* [S3] reciprocity and self-disclosure
	Personalization	[B1] to enrich interpersonal relationships [B2] to provide unique services [B3] to reduce interactional breakdowns	[C1] privacy	[S1] to learn from and about the user [S2] to provide customizable agents [S3] visual elements
Personification	*Identity*	[B1] to increase engagement [B2] to increase human-likeness	[C1] to avoid negative stereotypes [C2] to balance the *identity* and the technical capabilities	[S1] to design and elaborate on a persona
	Personality	[B1] to exhibit believable behavior [B2] to enrich interpersonal relationships	[C1] to adapt humor to the users' culture [C2] to balance the *personality* traits	[S1] to use appropriate language [S2] to have a sense of humor

10.4. Conclusions

Intelligent news distribution is the epitome of spreading news with intelligent performance via round-the-clock distribution and monitoring; interactive and communicative actions; flexible customization.

We propound that news distribution's seeming purpose of news delivery or distribution is to keep news users closer, psychologically and/or geographically, to information conveyed by different forms of carriers. Hence, news users are the nucleus of intelligent news distribution. And the innate logic of this distribution is concretely displayed through immersive personalization and interactive personification.

Notes

1 Chinese name is "央视频". It is a news platform featured by "5G+4K/8K+AI". http://tv.cctv.com/2019/11/20/VIDEwbJGqmWcwvH2fWNCx4q1191120.shtml Date accessed: 21 December 2019

2 https://www.chinanews.com/sh/2019/11-16/9009274.shtml Date accessed: 7 December 2019

3 https://www.journalism.org/2018/09/10/news-use-across-social-media-platforms-2018/ Date accessed: 8 December 2019

4 https://www.journalism.org/2019/10/02/americans-are-wary-of-the-role-social-media-sites-play-in-delivering-the-news/ Date accessed: 7 December 2019

5 https://www.journalism.org/2018/10/15/social-media-bots-draw-publics-attention-and-concern/ Date accessed: 8 December 2019

6 https://www.journalism.org/2018/09/10/news-use-across-social-media-platforms-2018/ Date accessed: 8 December 2019

7 http://cq.people.com.cn/n2/2019/1125/c367668-33571636.html Date accessed: 21 December 2019

8 For example, PressHalo is an off-the-shelf product of distributing news with AI and associated technologies. https://www.presshalo.com/about/

9 "[A]udience feedback juxtaposed with the story can affect how they process, perceive, and evaluate it." (Lee et al, 2017)

10 Immersion: sensation of being in an environment; physical immersion is a defining feature of virtual reality; mental immersion is the aim of most media creators (Vázquez-Herrero et al., 2017).

11 https://venturebeat.com/2019/11/10/ar-and-vr-will-make-spatial-journalism-the-future-of-reporting/

12 For instance, Google digital news innovation fund project: JAMES - Your digital butler. https://newsinitiative.withgoogle.com/dnifund/dni-projects/james-your-digital-butler-round-4/

13 https://venturebeat.com/2019/11/10/ar-and-vr-will-make-spatial-journalism-the-future-of-reporting/

14 The green dot is in the user's Field Of View (FOV) while the others have arrows pointing to their location.

15 This "register" can be understood in the linguistic sense.

16 Algorithm institutionalization is accounted by Napoli (2014) as the composition of institutional isomorphism and social constructivism from three perspectives: regulative, normative, and cultural-cognitive.

General Conclusions and Perspectives

A new form of media consumption, interaction and participation is on the horizon, which we have experienced in daily life due to technological and economical evolutions, the activity and privity between online and offline activism, and the black swan event -- COVID-19 pandemic. The media ecosystem, specifically in this study -- news media ecosystem, inevitably necessitates adjustments in some aspects of business models, news routines, and the rapport and competition between media logic, platform logic, political logic and commercial logic, with differentiation and simultaneously convergence of news industry and tech industry institutionally and functionally, particularly with regard to the division of labour and the scramble for capital. This news ecosystem is accompanied and evolves with precision journalism, network journalism, computational journalism, data journalism, mobile journalism, immersive journalism, iterative journalism (Marconi, 2020), and last but not least -- AI journalism.

In relation to public sphere, from the interrelated angel of the cultural cognition, norms, regulations and paraphernalia of media, the behaviors and practices of political communication we normally take for granted are also reflecting some emerging forms. Referring to nonrepresentaional theory and in order to make it effable, we call this as kinesis communication emphasizing fluid and procedural sociality, structurality and interactivity. According to Parks (2020), nonrepresentational theory underscores (a) the swirling unnameable impulses that propel bodily feelings and actions, (b) shape-shifting flows of contemporary experiences.

It seems that the academia generally accept the periodic development of media age or media waves due primarily to the evolving social-technical relation. While endorsing the adoption of technical innovation and cautiously avoiding innovator's dilemma (Christensen, 1997), the periodic development of media and communication innovation might not escape from periodic cycle mode especially in public sphere, and might not drastically make paradigmatic breakthroughs to liberate the full potential of relentlessly emerging media, if not involving the proactive political apparatus embracing the innovation of media logic and

platform logic. From the vantage point of citizen-prosumers of media and news, the media and information literacy should also progress for effectively dealing with the equilibrium and relation between protection, promotion and participation paradigms, for nurturing trans-domain literacy, under the circumstances that (a) AI and associated technologies vie for autonomy and subjectivity, (b) surveillance capitalism invades private sphere, (c) media manipulation, media polarization and populism gain their momentum with post-truth, (d) platform inequality and discrimination counteract platform empowerment.

Media development has its rhythm, and at different phases there exist comparatively dominant theories which are conducive to explaining and instructing media and communication practices, and the theories are always applicable under certain contexts and normally not categorical. For instance, from the viewpoint of social constructivism, we experienced and are experiencing network society, connective society, platform society and the coming AI-driven society. The progressing of media age or information wave is not a passage from one state to another but a convolution of one structure upon another.

Before AI-driven society, media are mainly the extension of/for human, either for mass media communication or social media communication. But what about post-social media that are potentially capable of taking over and substituting human interaction, such as social mediation, social deprivation**,** social substitution and social dominance by intelligent platforms and associated capital and political powers, such as in the form of interfaced communication. Platform logic and machine logic turn up as articulations of multiple alterity, not merely as human's instrument. Moreover, the COVID-19 pandemic appears to be the catalyst of this process, although technologically AI as the single factor has yet to offset the damage of the crisis.

Are we already theoretically equipped for the coming of AI-driven society and post-social media age, and for the surfacing of uncertainties at this critical junction? Throughout the chapters, our chief concern shall be the build-out of the paradigm of platformized communication and the approach of platformization, based on the functionality and automation of intelligent platforms in journalism and public sphere, so as

to attemptively develop a systemic framework that accounts for the reshaping of our media age.

In general sense, platformization is the procedural affect and realization of platform logic and platform architecture, and it is boosted by the dynamic of information transmission, user's interaction and technology innovation. Platformization's iterative process and responsive construction, in cultural production and algorithm institution, exert spill-over effect beyond the sectors of media and news, with respect to discourse and resource, economy and ideology, global cooperation and geopolitical confrontation.

Focusing on journalism platformization, the threshold for participation in news gathering, production and distribution is lowered, aided by AI and associated technologies (particularly with off-the-shelf media services and products), and via platform culture reflected on mobile journalism. Comparing to technological availability, media and news literacy is in urgent need to catch up the changes, in terms of updating its theory and implementing in practice. With regard to TV news' incorporation of platform logic and its role as a very influential news format and challenged by social media and digital native media, it is needed to hold balanced outlook on enforcing platform function and automation, mobile mediality and sociality.

Additionally, caution is necessary when extrapolating the benefits of platformization (particularly platform automation) to journalism, because of many **CHALLENGES** to meet.

(1) Challenges for JOURNALISTS

Demands on proactive adjustment

It is indicated that the introduction of AI to journalism might imperil the position of human journalists, which could probably result in sharp conflicts between laborers (journalists) and employers. To some extent, human journalists performing basic routine tasks are facing "cherish or perish" selection, either displaced by robot journalists or authoring the automation.

Human journalists should have a good grasp on recent developments and what they mean for their job, and proactively adjust themselves to use AI as a tool to complete creative works and liberate themselves from tedious and repetitive workloads. For example, algorithms can provide context and background to each research discovery, which can save journalists time for concentrating investigative and in-depth analyses.

Human journalistic authority threatened by automated news

AI substitutes a meticulous commitment to factuality, creates visualizations, tracks sources, and interacts with news consumers. The legitimacy of algorithms is gradually shaping, dependent upon the apparent logic of objectivity as a means of generating news. In contrast, the cognitive shortcomings of human journalists have been comparatively highlighted.

(2) Challenges for NEWS CONSUMERS

Facing platform discrimination

Platform discrimination is defined by us as the platforms' deprivation of rights from citizen-users to access various needed information. This emerging phenomenon and the latent connection between platform discrimination and vulnerability to fake news might be the side effect of news platformization.

The personalization of news feed and production based on the big data collected from the previous news consumption behaviors and habits is increasingly intersected with the discrimination that deprives news consumers' possibility and ability to unequivocally view more balanced and diverse news from digital platforms. Upon this, fake news might thrive, which leads to the vicious circle between platform contacts and fake news.

Shaded by algorithmic vagueness

Algorithms are "black boxes" to the audiences and are likely to change in accordance with business decisions and political wills, while hiding their underlying assumptions and premises, notwithstanding that touting themselves as free of interest, errors or subjectivity.

The logic for formulating specific stories are normally shaded from news consumers. Whereas, when AI as personal journalist to create personalized stories, the receiving party of AI news is entitled to be informed of "what the algorithm knows about them or how their story differs from what other users see" (Graefe, 2016), let alone transparency is a key tenet of journalism ethics.

(3) Challenges for TECHNOLOGIES

How to procure structured data

In order to expand the domain of AI journalism, the data model is requisite to procure multi-source structured data adequate enough to encode the journalistic knowledge necessary for automatically writing complex narratives.

How to transcend descriptive reporting

It is essential to find ways to simplify the acquisition of structured events and the automated extraction of structured event data from text, and to improve new techniques such as controlled natural language interfaces.

Lacking humanity in the humanized profession

Journalists should not just "bundle data together", but also bring a human presence to reporting. Human passion, values, creativity and sympathy, in which AI journalists are precisely deficient, ought not to be eliminated from journalism, despite the centrality of storytelling for news discourse and objective data.

To face these challenges, some preliminary and practical **PROPOSALS** are put forward for newsrooms.

(1) Institutionalization of algorithms as content creators

Labeling news-algorithm ingredients

The content created by AI should be labeled with detailed information about the functionality of the underlying algorithms for transparency, liability and accountability,

ethics. To be specific, it needs to identify five categories of information: human involvement, the underlying data, the model, the inferences made, and the algorithmic presence (Graefe, 2016).

Media system as moral agent

Human individuals are no longer taking the responsibility of moral agents as major as before the emergence of AI Journalism, because human journalists' professional moral obligation is diluted by the automation of algorithms, and many parties are involved in news production on various levels, e.g. media organizations, programmer/service providers of NLG, or data collectors. Media organizations as a whole, therefore, should have the defined stipulation to take ethical accountability.

Accumulating journalistic authority through institutionalization

Human and AI are both major actors in desperate for accumulating authority through their institutionalization. And they are organically integrated during the process, as AI relies on human intervention to formulate the automation procedures. Human journalists count upon AI to effectively and creatively delivering information to the public. Institutionalization can endow both with the legitimacy of quality journalism.

(2) Training automation editors and meta-writers

To accommodate to the development of high-quality journalism with algorithms, the specialized roles are needed to fit into the accurate work division. New posts appear in the AI media system, such as automation editor and meta-writer. The Associated Press hired automation editors, for example, to identify internal processes and to define the rules that an algorithm is to follow when creating a story from data. Meta-writers are required to define which words to use for describing a particular event, and determine the story structure. Automation editor and meta-writer will enrich the AI generated story with in-depth analyses, unique perspectives, interviews and behind-the-scenes reporting.

We advocate the cooperation of tech companies, media, and research institutions to cultivate and train journalists as meta-writers and automation editors to upskill them for AI journalism, for instance in the forms of workshops and internal-rotation programs where

journalists work alongside engineers, concerning using new tools in news routines, and the implications of relevant legislation, ethics, business models, etc.

Aside from the above discussions on the implications of journalism platformization, it is necessary to discuss the justice of modelling platformization and the justice of the theoretical claims. A number of common assumptions (Hayes, 2005) are made in many cases, when communication researchers apply the "scientific" method to the field of study. They are (1) The World is Orderly; (2) Empiricism; (3) Parsimony; (4) Progression in Small Steps; (5) The Nonexistence of Proof; (6) Falsifiability. This study attempts to align itself with these assumptions, while we bear in mind that:

Firstly, our explanation for platformization in news sphere and public sphere, based on relatively limited cases, inadequate literature and subjective judgement, must be testable and must be possible for evidence inconsistent with the conclusions. But it is still essential to conceptualize platformization as the influence and implementation of platform logic and platform architecture in a simplified and operational way, as a model for our interpretations which *suggest* that (1) digital platforms are not only the conspicuous discourse but also the inevitable constituent of media, social and political realities; (2) TV news is in a kind of complexity of being challenged by and simultaneously in need of digital platforms, which makes TV news consumption's political implications even more complex; (3) Mobile and intelligent news production and consumption shows rapport with political engagement; (4) Infopower possessed by digital platforms and their institutional entities is likely to arouse agitations for challenging the commercial and political establishments and threatening personal autonomy in the convoluted digital media environment; (5) AI and associated technologies change journalistic process, and the corresponding news literacy requires updates under the new systemic framework which we propose as AI journalism.

Secondly, we follow the line of defining "theory" from the interpretive perspective as "the imaginative understanding of the studied phenomenon". "This type of theory assumes emergent, multiple realities; indeterminacy; facts and values as linked; truth as provisional; and social life as processual" (Charmaz, 2006). The theoretical essentiality of this study is

the well-timed abstract construction and analytical tool to transcend the traditional mediatization theory and posit platformization theory for further negotiation and negation.

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Part 1

Chapter 1

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Appendices

A. Bibliometric analysis of ¨Mediatization¨ and ¨Platformization¨

(1) "Mediatization"

Search on Web of Science[1]

Search date: April 28, 2020

Search terms: Mediatization OR Mediatisation

Search field: Topic[2]

Findings:

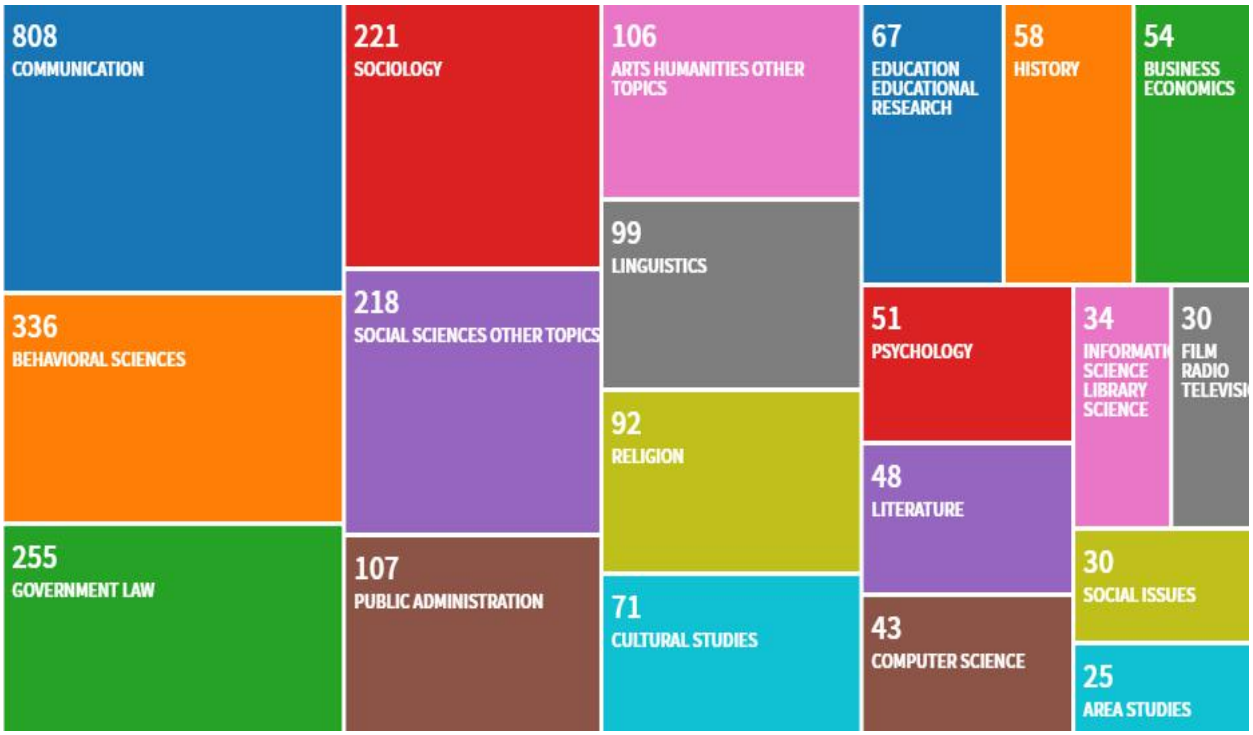

Figure 1 Top 20 research areas based on publication numbers

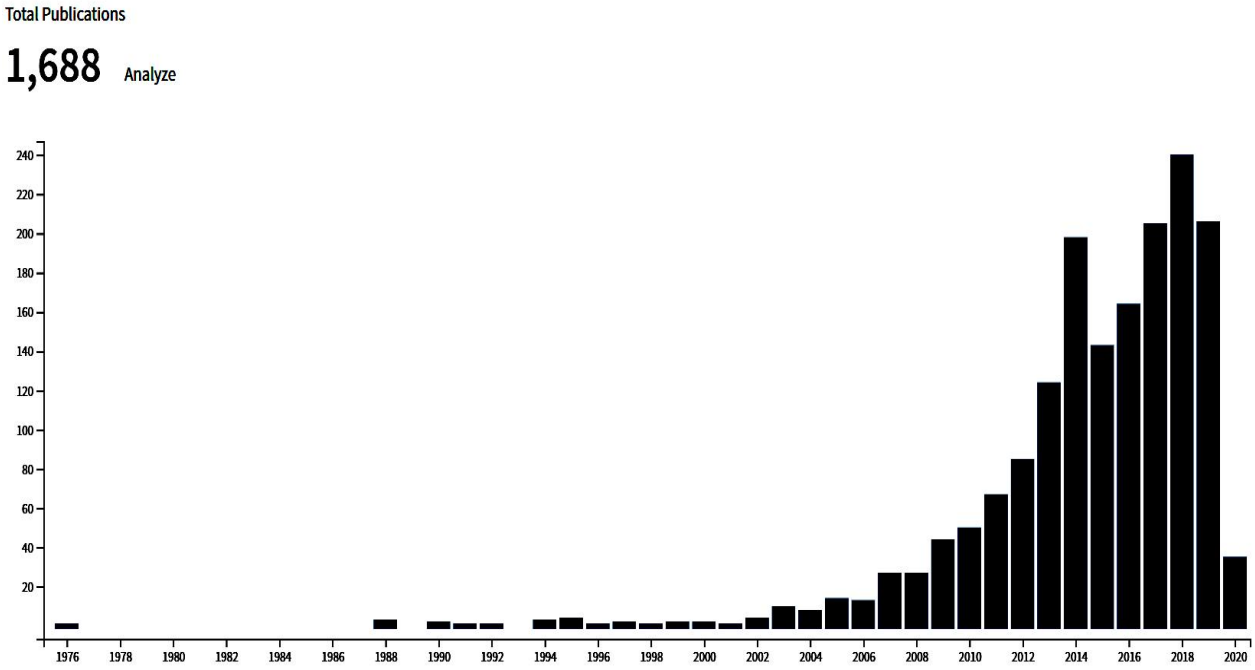

Figure 2 Publication numbers per year from 1976 to April 28, 2020

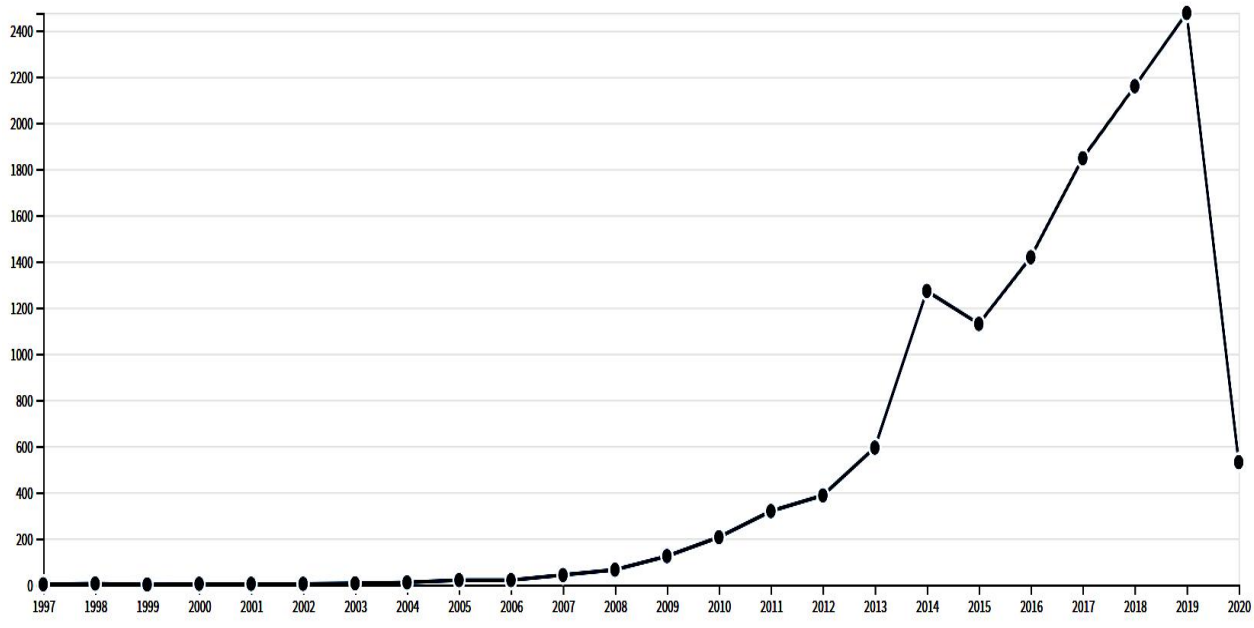

Figure 3 Sum of times cited per year from 1997 to April 28, 2020

(2) "Platformization"

Search on Web of Science

Search date: April 28, 2020

Search terms: Platformization OR Platformisation

Search field: Topic

Findings:

Figure 4 Top 20 research areas based on publication numbers

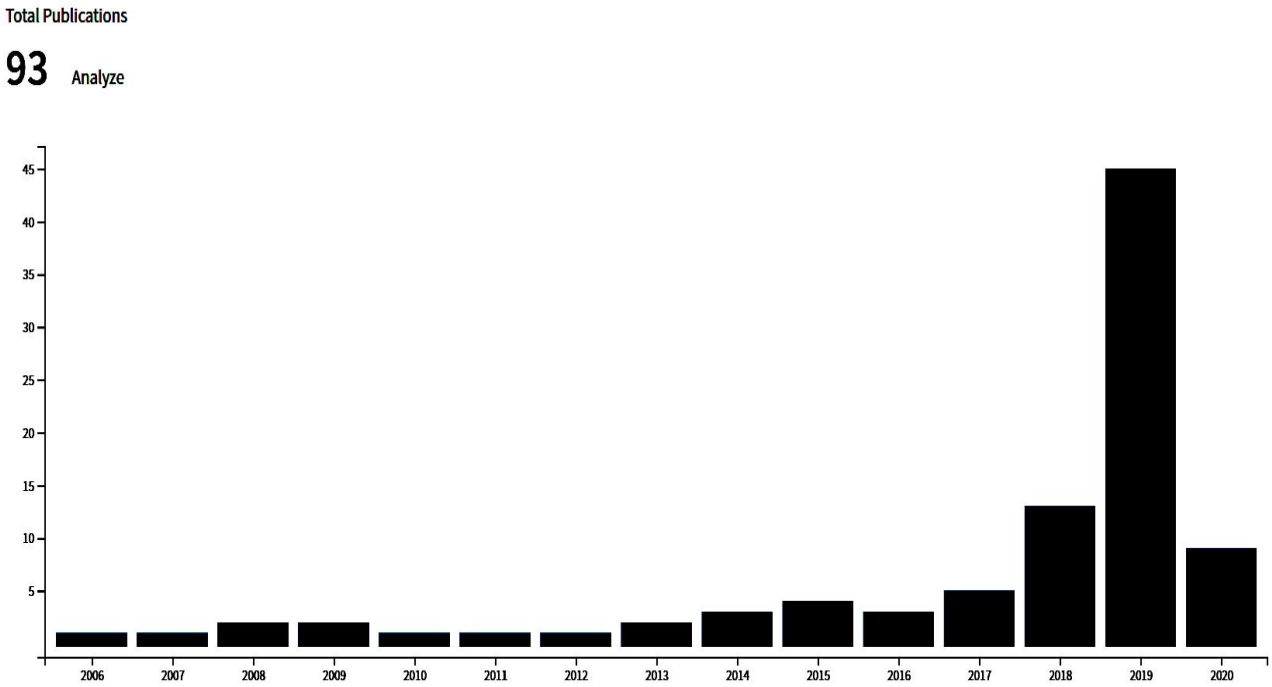

Figure 5 Publication numbers per year from 2006 to April 28, 2020

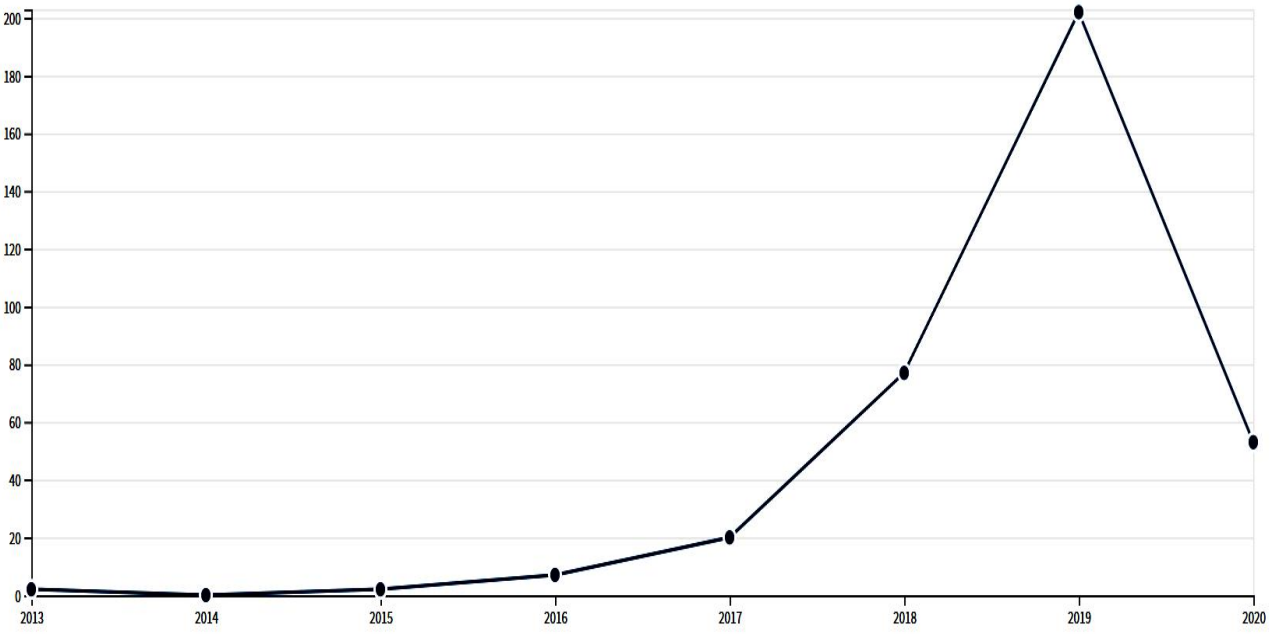

Figure 6 Sum of times cited per year from 2013 to April 28, 2020

B. Key points of mastering mobile journalism

Mobile journalism shows the propensity to change the traditional journalism and public behaviors, affords an approach to arming ordinary people to franchise themselves, manifests the potential as one crucial digital literacy to bridge spheres of communication in schools, communities and the journalism profession.

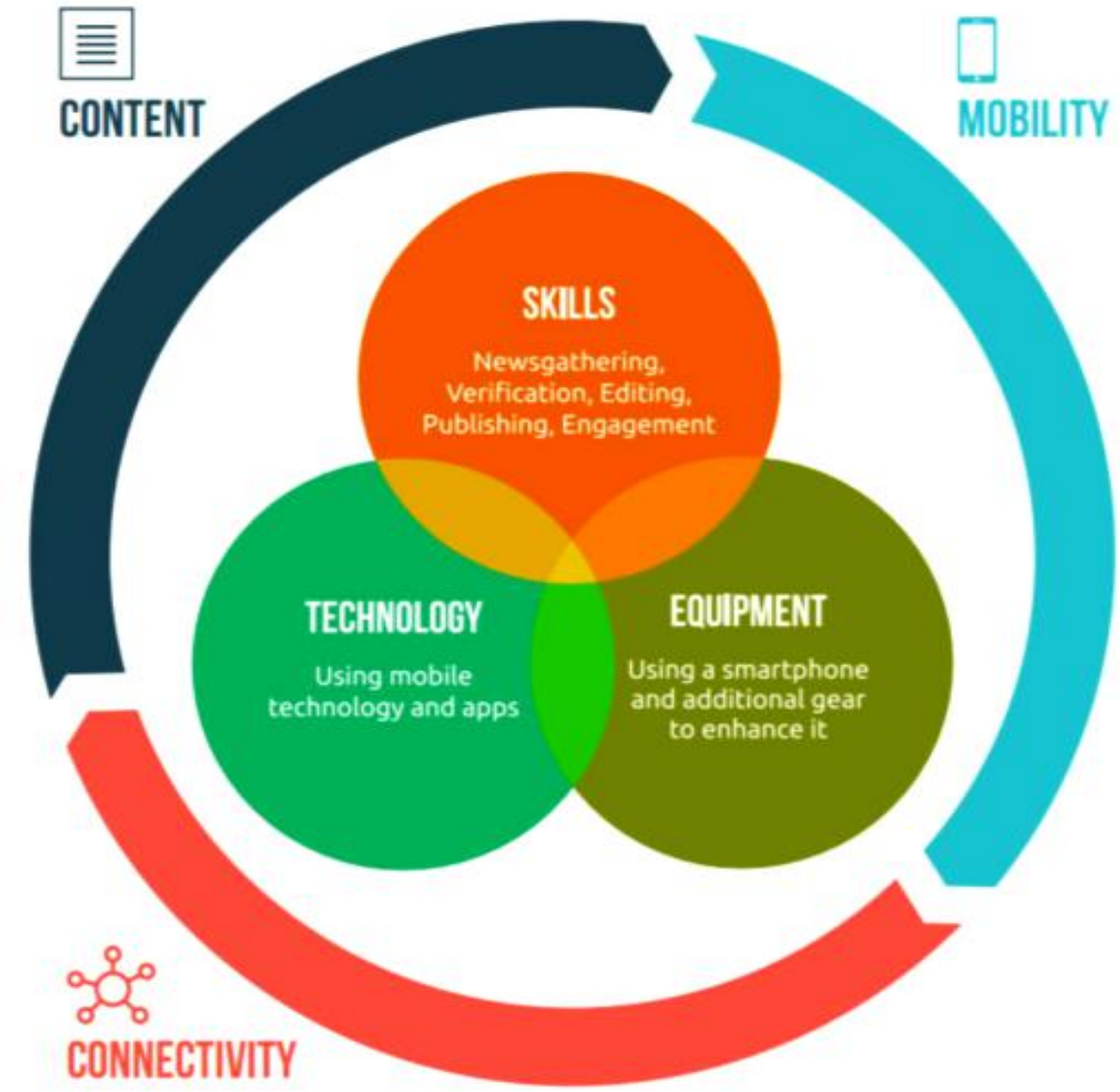

Figure 7 Content, mobility and connectivity for mobile journalism[3]
(Source: Aljazeera Media Training & Development Centre)

C. Nomenclature comparison between classical journalism and AI journalism

Considering technological upheaval and news routines' evolution, it is necessary to be more precise in the conceptualization and characterization of each of the elements that participate in the process, based on the comparison between classical journalism(without AI tools) and AI journalism.

Table 1 Classical journalism and AI journalism

	Classical Journalism	AI Journalism
Facts or events	The factual processes that become the main reference of information. These facts (1)are part of reality, but never appear in the rough; (2)are made up of action, and intentional or uninetntional actors; (3)have the significant and precise impact on the modification of some aspect of reality.	Various sets of pure variants. For instance, the 4-tuple event representation {s, v, o, m} defined by Martin et al, "where v is a verb, s is the subject of the verb, o is the object of the verb, and m is the modifier."[4]

News events	All the facts are susceptible--given their signficativity, usefulness or possible impact--to enter the journalistic process. The attribute of news is never an intrinsic attribute to a fact, but it always results from the application of certain value-based credits to a given reality. Therefore, news events are the result of an intellectual process and an intentional assessment by a certain agent.	The structured representation of variant set that is added with news worthiness, i.e. proximity, significance, conflict, timeliness, the ununsual, prominence, visual/aural emphasis, etc.
Sources of information	People, organizations or devices that are likely to be used as transmitters of information about a certain news event. The sources can be passive or active. They can act at the request of journalistic organizations, and can be active when they mobilize on their own. News agencies normally play a significatnt part by representing active sources.	Sensors and algorithms that are capable of detecting the environment constituted by physical spaces and the mediated information context. On the whole, algorithms operate as the infrastructure for primal level of organization

Journalists	Human agents that assume information from the factual context or from different sources, process it and construct new information presented in one format or different formats of contents aimed at the potential audience.	The hybridization of algorithms and human agents -- or the fully automation of algorithms and robots-- which assumes information from gathered data or the factural context, process it and structure new information presented in one or different formats of personalized contents, with the potential of targeting customized audiences at scale.
Contents	It is the generic name used to describe the different semiotic texts, coded according to certain languages, susceptible to being deciphered and understood by the public.	Same with classical journalism
Content system	It is the flow of temporality --or the organization of spatiality-- that acquires the contents in a particular presentation of instance: the cover of a website, a paper diary, a front page of social media, etc. This system establishes, based on certain conventions, a certain categorization and hierarchy of content, and constitutes by itself a system of orientation for the spectators or readers.	Same with classical journalism

Publics	It is the group of people to whom the information prepared by journalists is addressed.	Same with classical journalism
Medium of information	It is the channel through which circulate the contents produced by journalists to access their audience. In general, channels are the result of determined combinations of technologies, processes and institutions that depend on contexts, social and institutional organization.	Same with classical journalism, while emphasizing more on technological infrastructures, such as 5G, VR/AR, 8K.
Access mode and user experience	This is the way in which a certain public makes contact with journalistic content and the mode in which it processes and assumes the information received from the perceptual point of view as well as intellectual, emotional and value-oriented.	Same with classical journalism, while emphasizing more on immersive perception and personalized interfaces to big data.
User activity or content generated by the public	This is the response activity or content development that the public performs on the public or semi-public platforms, and that is incorporated into the infomation flow or content organization.	Same with classical journalism, while emphasizing more on technological services and interaction.

D. Chronology of AI journalism

Theoretical works

2007 Computer as News Source S. Shyam Sundar et al.

News Cues: Information Scent and Cognitive Heuristics

2007 Journalist Robot System Matsumoto et al.

Journalist Robot: Robot System Making News Articles from Real World

2010 AI News Ontology Norberto Fernández et al.

The NEWS Ontology: Design and Applications

2011 AI News Consumers' Digital Identity Noam Lemelshtrich Latar Sammy et al.

The Future of Journalism: Artificial Intelligence And Digital Identities

2012 Human Journalists' Core Skills Against News Automation
Arjen van Dalen et al.

The Algorithms Behind The Headlines: How Machine-written News Redefines the Core Skills of Human Journalists

2013 Personalized Narrative Generation Elena Rishes et al.

Generating Different Story Tellings from Semantic Representations of Narrative

2014 Algorithmic Institutionalization Philip M. Napoli

Automated Media: An Institutional Theory Perspective on Algorithmic Media Production and Consumption

2014 Users' Perception of Automated News Christer Clerwall

Enter the Robot Journalist

2016 Concept of Automated Writing Konstantin Nicholas Dörr

Mapping the field of Algorithmic Journalism

2017 Ethical Framework of AI Journalism Konstantin Nicholas Dörr et al.

Ethical Challenges of Algorithmic Journalism

2017 Journalists' perception of Robo-wirting Neil Thurman, Konstantin Dörr & Jessica Kunert

When Reporters Get Hands-on with Robo-Writing

2018 Evaluation of Computer-generated News Magnus Melin et al.

No Landslide for the Human Journalist -- An Empirical Study of Computer-Generated Election News in Finland

2018 Readers' Perception of Computer-generated News Andreas Graefe et al.

Perception of Automated Computer-Generated News: Credibility, Expertise, and Readability

2018 Automated Fact Checking James Thorne et al.

Automated Fact Checking: Task Formulations, Methods and Future Directions

2018 Event-driven Narrative David Caswell & Konstantin Dörr

Automated Journalism 2.0: Event-driven Narratives

2018 Perceptions of AI Journalism among Spain's Journalists José-Miguel Túñez-López et al.

Automated-content Generation Using News-writing Bots and Algorithms: Perceptions and Attitudes amongst Spain's Journalists

2019 Hybridization Theory Nicholas Diakopoulos

Automating the News: How Algorithms Are Rewriting the Media

2019 Relationship of Humans and Machines in Journalism Seth C. Lewis et al.

Automation, Journalism, and Human–Machine Communication: Rethinking Roles and Relationships of Humans and Machines in News

2019 Chatbot News Distribution Bronwyn Jones et al.

Public Service Chatbots: Automating Conversation with BBC News

2019 Atomised News Rhianne Jones et al.

Atomising the News: The (In)Flexibility of Structured Journalism

2020 Iterative Journalism Francesco Marconi

Newsmakers: Artificial Intelligence and the Future of Journalism

Emblematic praxis

2012 Forbes.com announced its use of Narrative Science's Quill platform.

2013 Washington Post debuted the prototype of Truth Teller -- a news application that fact-checks speeches in near real time.

2014 Los Angeles Times used a software Quakebot to report an earthquake.

2014 Associated Press began using automated writing technology to produce earnings stories.

2016 Reuters launched software News Tracer that relies on machine learning algorithms to analyse tweets to discover breaking news.

2016 Washington Post used a data-crunching program -- Heliograf to cover every House, Senate and gubernatorial race in the USA on Election Day with functions of geo-targeting and news alerts for users.

2017 BBC utilized AI as TV show's director involving the switch from one panellist to another when they come to speak.

2017 Tencent showed its AI system -- Dreamwriter that could write a report about a speech while just the speech ended.

2018 Xinhua News Agency in cooperation with Alibaba Group used the platform "MAGIC" to automatically generate news videos for 2018 FIFA World Cup.

2018 Xinhua News Agency created AI-synthesized News Anchors.

2018 NHK's anime reporter Yomiko was designed to feature within the main news bulletin and read news via Amazon Alexa and Google Home.

2018 Talpa Network and the Netherlands football governing body - KNVB used AI technology for VoetbalTV. Some 80,000 amateur matches per year can be broadcast fully automatically using smart cameras and smart software.

2018 Nippon Television Network Corporation (Nippon TV) hired a humanoid TV Anchor -- Erica Aoi.

E. Literature search about automated news detection studies

The **academic articles** published until February of 2019 were searched in **February of 2019** on the digital platform of *UAB Bibliotecas*[5], which covers relevant databases[6] listed below.

Databases

Communication and journalism databases

- Communication and Mass Media Complete.
  Articles and references from specialized journals and books. International geographic scope with special incidence in the Anglo-Saxon world.
- International Encyclopedia of Communication
  It includes 1,339 articles, divided into 29 study areas. Allows simple and advanced search and to browse a table of contents that includes thematic areas, people, chronological periods, places and topics.
- Communication portal
  Project of the Institute of Communication of the UAB. It offers information and specialized documentation in different aspects related to communication. It includes a broad directory in the academic resources section.
- Dictionaries of communication and related sciences
  Web prepared by the Communication Library, which includes dictionaries, glossaries and encyclopedias.
- Guiademediosdigital.com
  Directory of Spanish media containing information on groups, media and professionals. It offers contact data, contracting conditions, content, audience index and OJD control.
- OJD
  Boletín de la Oficina de Justificación de la Difusión. Database with information on circulation of Spanish newspapers and magazines.
- Press databases
  List of indexing services and other resources of interest.
- Audience guide
  A selection of resources and media assembled by the Communication Library to access audience data of radio, television and theatre, newspaper and magazine distribution, as well as the music, video and DVD sales market.
- Dictionaries of communication and related sciences
  Include dictionaries, glossaries and encyclopedias.
- Pew Research Center - Journalism & Media

- European Journalism Center

  Grants, conferences and training resources for journalists. Its page Media Landscapes makes an analysis on the media industry in the different countries of Europe.
- Reuters Institute

  They publish reports and research papers on trends in journalism and the media.
- Center for Investigative Reporting

  On its website you can find a large number of research reports as well as videos and podcasts from the Reveal radio program.
- International Federation of Journalists

  International organisation formed by journalists and federations from more than 100 countries. It defends the freedom of the press and the organization of journalists. In its publications you can find topics as copyright, media concentration, journalism and human rights, trade unionism, etc.
- Reporters without borders

  International association for press freedom. It defends persecuted journalists, cares for their safety and denounces censorship. It publishes an annual report on the state of press freedom in different countries.
- Proquest Central

  Set of databases of various themes. It includes topics such as marketing, communication and also press databases.
- Taylor & Francis online

  Database that indexes more than 50 communication journals.
- Dialnet

  Either summaries or full text of Spanish journals, full text of theses from the Spanish universities and bibliographic references of books.
- Raco

  Cooperative repository of Catalan scientific, cultural and erudite journals.

Electronic, computer & telecommunication systems engineering databases

- The ACM digital library

  Platform with the full text of all the publications of the Association for Computing Machinery (ACM), including magazines, conference proceedings and books. It also includes full text from other publishers. On the other hand it contains "The ACM Guide to Computing Literature", a complete bibliographic database centered exclusively in the field of computer science.
- ArXiv.org

  Scientific deposit maintained by the Library of the University of Cornell for the publication of scientific articles in digital format and in open access, in the fields of mathematics, physics, computer science and electrical engineering, among others.

- CiteSeerX

  Researcher of scientific literature, mainly computer science and information science, developed by the College of Information Sciences and Technology - The Pennsylvania State University, with the aim of improving the dissemination of this literature and providing improvements in functionality, usability, availability, etc. in access to scientific and academic knowledge.

- The Collection of Computer Science Bibliographies

  Collection of references of scientific literature on computer science. It consists of more than 7 million, most of them are articles, papers presented at congresses and technical reports. It is updated weekly and is open access.

- IEEE Xplore: digital library

  Full text database of IEEE and IEE publications. Contains magazines, articles, standards and conferences since 1988 on electrical and electronic and computer engineering.

- ÍnDICEs CSIC

  New portal in the databases of the CSIC, this is a multidisciplinary bibliographical resource that compiles and disseminates mainly research articles published in Spanish scientific journals and replaces "CSIC Databases: ICYT, IME, ISOC"

- Lecture notes in computer science

  Full text database for books and magazines in the “Lecture Notes in Computer Science” (LNCS) collection. It includes the sub-collections “Lecture Notes in Artificial Intelligence” (LNAI) and “Lecture Notes in Bioinformatics” (LNBI).

- Scopus

  It is the database of summaries and quotes reviewed by the world's largest counterparts. It contains information in 40 languages, plus non-English coverage (6900 European journals, more than 50% of the titles are European, South American and Asian-Pacific).

- Web of Science (WoS)

  Website portal of the Clarivate Analytics company that allows the access to a set of bibliographic and bibliometric databases of a multidisciplinary nature.

Search results

- With the purpose of encompassing the articles as many as possible, the first round of filtering and selection is based on the general relevance of the articles' abstracts to the keywords. The counting is showed bellow.

Table 2 Search results

Keywords Combination	**Numbers of Articles[7] Published Until February of 2019**	**Numbers of Selected Articles**
Journalism +Artificial Intelligence	295	23
Machine Learning +Journalism	335	32
Deep Learning +Journalism	108	2
Journalism + Bots	96	15
Automatic Event Detection + News	152	33
Automatic Topic Extraction + News	126	35

- The second round of filtering is predicated on the specific pertinence of the content to the topic of news detection. The following articles are picked out from the selected articles of first round.

(1) Gu, Y. *et al.* **Detecting Hot Events from Web Search Logs***. Conference Proceedings -- Web-Age Information Management* (2010).

(2) Lee, C. H., Chien, T. F. & Yang, H. C. **An automatic topic ranking approach for event detection on microblogging messages**. *Conference Proceedings -- IEEE International Conference on Systems, Man and Cybernetics.* 1358–1363 (2011).

(3) Guille, A. & Favre, C. **Event detection, tracking, and visualization in Twitter: a mention-anomaly-based approach**. *Social Network Analysis and Mining.* 5, 1–18 (2015).

(4) Hua, T., Chen, F., Zhao, L., Lu, C. T. & Ramakrishnan, N. **Automatic targeted-domain spatiotemporal event detection in twitter**. *Geoinformatica.* 20, 765–795 (2016).

(5) Dashdorj, Z., Tsogtbaatar, B., Tumurchudur, A. & Altangerel, E. **High Level Event Identification in Social Media**. *Proceedings -- 12th International Conference on Semantics, Knowledge and Grids, SKG* (2016).

(6) Capdevila, J., Cerquides, J. & Torres, J. **Event Detection in Location-Based Social Networks.** *Book -- Data Science and Big Data: An Environment of Computational Intelligence* (2017).

Notes

1 https://apps-webofknowledge-com.are.uab.cat/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=C5wyYOcRp3WO6tO6gOa&preferencesSaved=

2 Web of Science means “search in Topic” as “enter Topic terms to search the following fields within a record: Title, Abstract, Author Keywords, Keywords Plus®”.

3 Aljazeera Media Training & Development Centre, “Mobile Journalism”, http://institute.aljazeera.net/mritems/Documents/2017/1/24/e60d6cf73db74eb7ab55b0f24a8836a8_ 100.pdf. Date accessed: 17June 2017.

4 Martin, L. J. et al. (2018). Event Representations for Automated Story Generation with Deep Neural Nets. The Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-18).

5 https://cataleg.uab.cat/iii/encore/home?lang=cat&suite=def&advancedSearch=true&searchString=

6 https://www.uab.cat/web/subject-guides/communication/communication-databases-1345764840524.html

https://www.uab.cat/web/subject-guides/engineering/engineering-databases-1345788756590.html

7 There might be redundancies due to the technological inefficiency of the searching platform.