



Theory and Applications of Web 3.0 in the Media Sector

Charalampos A. Dimoulas * and Andreas Veglis *

Multidisciplinary Media & Mediated Communication (M3C) Research Group, School of Journalism & Mass Communications, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

* Correspondence: babis@eng.auth.gr (C.A.D.); veglis@jour.auth.gr (A.V.)

Abstract: We live in a digital era, with vast technological advancements, which, among others, have a major impact on the media domain. More specifically, progress in the last two decades led to the end-to-end digitalization of the media industry, resulting in a rapidly evolving media landscape. In addition to news digitization, User-Generated Content (UGC) is dominant in this new environment, also fueled by Social Media, which has become commonplace for news publishing, propagation, consumption, and interactions. However, the exponential increase in produced and distributed content, with the multiplied growth in the number of plenary individuals involved in the processes, created urgent needs and challenges that need careful treatment. Hence, intelligent processing and automation incorporated into the Semantic Web vision, also known as Web 3.0, aim at providing sophisticated data documentation, retrieval, and management solutions to meet the demands of the new digital world. Specifically, for the sensitive news and media domains, necessities are created both at the production and consumption ends, dealing with content production and validation, as well as tools empowering and engaging audiences (professionals and end users). In this direction, state-of-the-art works studying news detection, modeling, generation, recommendation, evaluation, and utilization are included in the current Special Issue, enlightening multiple contemporary journalistic practices and media perspectives.

Keywords: web 3.0; semantic web; media industry; journalistic practices; journalism 3.0; news semantics; news recommendation; media automations; disinformation; hate speech



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1. Introduction

In today's exploding Web landscape, vast amounts of information (documents, images, sounds, videos, multimedia storylines, etc.) are produced and published daily from various sources worldwide. As a result, the formation of the news agenda becomes tricky, as does the process of being credibly and reliably informed. Hence, plenary individuals, both in the roles of news consumers and content contributors (usually wearing the hat of citizen journalists), but also professional journalists and media communication experts, often find it difficult to retrieve specific and detailed information about a (complicated) topic to form a comprehensive informing or reporting view [1–4]. Today's news is mostly published in an irregular way, with multimedia assets (posts and articles, comments, reactions, etc.) propagating through a network of unstructured forms of data (and metadata). Users have to navigate multiple content instances and interconnecting nodes, lacking an efficient infrastructure to quickly discover, acquire, and analyze the information needed, which limits the news stream's exploitation prospects. Consequently, new challenges arise for algorithmic media automations concerning both news production and consumption ends (i.e., machine-assisted reporting, content selection/generation, validation, publishing, recommendation, retrieval, personalization, semantics, and so on) [5–11].

Since digital informing and mediated communication dominate today's ubiquitous society, content creation and publishing are no longer restricted to large organizations, with anyone being able to upload information in multiple formats (text, photos, audio, or video) [12]. Social media have emerged and broadly expanded to become the common

everyday practice for thousands of people, offering simplicity, immediacy, and interactivity [1–4,12]. Furthermore, the proliferation of mobile devices (smartphones, tablets, etc.) and their inherent content-capturing and networking capabilities fueled citizen and participatory journalism paradigms, enabling plenary users to contribute User-Generated Content (UGC) fast and effortlessly (i.e., personal or public information, such as news events/stories, articles, opinions, comments, etc.) [1,9–14]. At the same time, the plurality of data and news streams created urgent needs for better content documentation, validation, and management [1,4,9–15]. Hence, the advancement of the Semantic Web (SW) or Web 3.0 has been envisioned as a sophisticated solution to the above problems and challenges aspiring intelligent multimedia processing, analysis, and creation techniques [4,9,10,16].

Web 3.0 stands as the physical extension of the current Web where information is given a well-defined meaning, better enabling computers and people to work in cooperation [4,9–14]. Therefore, it can be seen as an Internet service with sophisticated technological features, in which proper/standardized documentation and semantic tagging will be delivered with the help of algorithms (in fully or semi-automated processes) [4,9,10]. These features attempt to form a Web environment in which humans and machines understand and interpret web-streamed information in the same context. The so-called SW services embody and integrate technologies aiming to complete the transition from today's Web of documents to a Web of well-documented data, where every piece of information will be accompanied by its semantic, conceptual, and contextual metadata. Fully structured and clarified relations to others (users, events, stories, models, etc.) will expedite data visualization and display purposes, also facilitating interoperability and integration between systems, environments, and applications, interconnecting concepts rather than just documents [4–10,16–19]. Thus, journalists and plenary individuals (content contributors and news consumers) will be able to efficiently discover, integrate, and reuse pieces of information from various sources. At this point, where the journalism and news industries intersect with Web 3.0, well-established journalistic practices/workflows are challenged by more sophisticated semantically enhanced procedures towards the transition to Journalism 3.0 [4–8,20,21]. As a result, the advanced technological framework unlocks various data exploitation capabilities, leading to higher functional levels. For instance, newsroom automations can expedite Web-Radio/-TV services with innumerable live streaming and post-processing augmentations [22,23], while they can also provide framing insights for better organizing blogs and news online [24] or data monitoring and gathering options for post-analysis purposes [25,26].

Contemporary Semantic Web and Big Data technologies are continuously elaborated to advance multimodal data analysis concerning information classification, semantic conceptualization and contextualization, content validation, and management automations, which can be primarily deployed in the sensitive news and media domains [1–4,16,19–29]. These modular automation and augmentation layers can fuel interaction mechanisms between corporations, machines, and individuals to accelerate crowdsourcing procedures for constructing and maintaining suitable media repositories [16,18,27,29]. Thereafter, digital literacy initiatives and audience engagement strategies can enhance the impact of SW services in the media world and the broader society. The current Special Issue enlightens the above perspectives through theoretical, algorithmic/technological, and case-study contributions, discussing challenges and state-of-the-art solutions on news detection, classification, (semantic) analysis and evaluation [12,18,27,29,30], automated modeling/prediction, generation, and recommendation of news content [19,31–33], evolution, aesthetics, and integration evaluation of Web 3.0 elements in news websites [34–36].

2. Contributions

The current Special Issue focused on enlightening the above multidisciplinary areas, inviting researchers to submit featured research works on intelligent media processes and practices related to news production, validation, management, publishing, etc., placing semantic services and metadata processing towards automated content generation,

recommendation, and assessment. Eleven (in total) contributions ($C_i, i = 1 \dots 11$) were finally published within this Special Issue, elaborating on the perspectives of *Theory and Applications of Web 3.0 in the Media Sector*. The present section outlines the conducted works and their research outcomes, with Table 1 highlighting each article's scientific focus and contribution.

Table 1. Contributions by research areas, involved technologies, and proposed solutions.

Contributions	Research Area/Focus	Involved Technologies/Solutions
Contribution 1 (C1)	Hate speech detection and emotion analysis	Natural language processing and machine/deep learning algorithms in news semantics, web interface for data crowdsourcing and datasets creation
Contribution 2 (C2)	Financial forecasting from news websites and social networks using huge volumes of data (big data)	Natural language processing and machine/deep learning algorithms in stock forecasting, sentiment analysis, investment recommendations
Contribution 3 (C3)	Assessment of news homepages over the years (aesthetic-, functional-, content-wise)	Content analysis, aesthetics, and responsive design aspects (web, mobile, multiformat), audience analytics/insights, social instrument (interviews)
Contribution 4 (C4)	Automated news generation/publishing for earth observation/disaster reporting	Big data and artificial intelligence algorithms in breaking news detection, sentiment analysis, and automated/personalized news-report generation
Contribution 5 (C5)	Semantic preprocessing for breaking news detection (in Drone Journalism)	News streams monitoring/semantics, spatiotemporal and contextual detection of (breaking) news events, Drone Journalism recommendations
Contribution 6 (C6)	Semantic web integration analysis (in Art and Culture websites)	Contextual features, metrics, art/culture websites features, semantic web integration assessment
Contribution 7 (C7)	Audio semantic analysis and visualizations for audiovisual forensics	Semantic visualizations of machine/deep learning and signal processing to detect audio tampering
Contribution 8 (C8)	Social network analysis and visualization for tracing disinformation	Natural language processing and machine/deep learning algorithms in tracing and visualizing suspicious/inaccurate informatory streams
Contribution 9 (C9)	Analysis of aesthetic trends and semantic web adoption of media outlets	Automated archival data extraction and analysis to assess Semantic Web integration trends, DOM structure complexity, graphics, and color usage
Contribution 10 (C10)	News recommendation systems (NRS) modeling and evaluation	Experimental approach treating the NRS as a black box, entailing users as testers of algorithmic systems (algorithmic/collaborative audit methods)
Contribution 11 (C11)	Chatbot Media Automations in Professional Journalism	Experimental approach on the use of chatbot tools that are evaluated metric-wise and through social instruments (workshops)

The first paper presents the development and evaluation of a web interface (with its algorithmic backend) for creating and querying a multi-source database containing hate speech content [12]. Vrysis et al. (2021) implemented a Graphical User Interface (GUI) within the European project PHARM (Preventing Hate against Refugees and Migrants) to monitor and model hate speech against refugees and migrants in Greece, Italy, and Spain. The monitoring includes Social Media content, i.e., Twitter, YouTube, and Facebook comments and posts, as well as comments and articles from a selected list of websites, with the platform supporting the functionalities of searching (the formulated dataset), web-scraping, and annotating additional records to contribute new samples to the repository. As an outcome, textual hate speech detection and sentiment analysis are provided using novel methods and machine learning algorithms, which can be used either for tracking and evaluating external web streams or for self-checking articles before making them public, also supporting media literacy. The interface and the involved methods are objectively (metric-based) and subjectively assessed, with the gained positive evaluation confirming the approach's usefulness and the interface's usability (Contribution 1).

The second paper focuses on automated stock forecasting using both financial and textual data from news websites and social networks (Twitter, Stocktwits), combining methods from various scientific fields, such as information retrieval, natural language

processing, and deep learning [31]. Theodorou et al. (2021) present the supportive platform ASPENDYS, developed as part of the homonymous European research project, intending to facilitate the management and decision making of investment actions through personalized recommendations. The implicated processing relies on technical analysis and machine learning methods for the financial data treatment, with textual data being analyzed in terms of reliability and sentiments towards an investment. As an outcome, investment signals are generated for a certain transaction combining the financial and sentiment analysis insights, which are finally recommended to the investors. A watchful assessment is conducted concerning the interface and its functionalities (i.e., portfolio management, sentiment analysis, extracted investment signals), with the application use cases illustrating practical uses and validating the approach's helpfulness and impact (Contribution 2).

The third paper deals with the evolution of news presentation in online newspapers, monitoring their visual progress from simple digital editions that merely served to dump content from print newspapers (rigidity) to sophisticated multi-format multimedia products with interactive features (exuberance) [34]. Peña Fernández, Casado del Río, and García-González (2021) conducted a longitudinal study on the design of online media, analyzing the front pages of five general information Spanish newspapers (elpais.com, elmundo.es, abc.es, lavanguardia.com, and elperiodico.com (accessed on 20 April 2023)) over the past 25 years (1996–2020). Further, six interviews were conducted in parallel with managers of different online media outlets. The evaluation results, combining content analysis and subjective assessment of the interviewees' responses, revealed an evolution from static and rigid layouts to dynamic, mobile, and responsive formats, displaying a balance between text and visual elements. The analysis included the language used, multimedia features, audience habits, and the degree of the offered interactions. Hence, without explicitly tackling semantic services evolution, the current work indicated presentation and functional changes in the online media frontpages, some of which are triggered by shifting to Web 3.0, while others point to the need for further semantic automations, customizations, and personalization in the upcoming Web eras, 3.0 and beyond (Contribution 3).

The fourth paper focuses on collecting and processing diverse and heterogeneous information, where multimedia data can be extracted from different sources on the Web [19]. In the context of the Journalism 3.0 vision, Tzouma, Zamichos, Efthymiadis, Drosou, and Tzovaras (2021) explore the possibility of creating a tool for utilizing Earth observations, i.e., to manage the massive volumes of image data, thus helping media industry professionals in the selection, usage, and dissemination of such (news) content to the public. Hence, intending to make productive satellite images for professionals who are not familiar with image processing (as other related tools require), a novel platform is implemented to automate some of the journalistic practices, i.e., to detect and receive breaking news information early in real time (especially for events related to disasters, such as floods and fires) to retrieve and collect Earth observation images for a certain event and to automatically compose personalized articles adapted to the authors' writing styles. The crafted EarthPress platform comprises the user interface, the user manager, the database manager, the breaking news detector, the data fusion, the data/image processing, the journalist profile extractor, and the software bot (EarthBot) that is responsible for the text synthesis, thus containing dominant semantic web features. Based on the conducted analysis and assessment, EarthPress represents an added-value tool, not only for professional journalists or editors in the media industry but also for freelancers and article writers who use the extracted information and data in their articles (Contribution 4).

The fifth paper casts light on the semantic preprocessing of Web and Social Media informatory streams, aiming to detect breaking news events, especially those suited for drone coverage (e.g., physical disasters, such as earthquakes or storms, fire or traffic accidents, traffic jam problems, etc.) [18]. Niarchos, Stamatiadou, Dimoulas, Veglis, and Symeonidis (2021) elaborate on the need for news validation and documentation using piece-of-evidence material, such as visual and multimedia documents of photo/video footage. While reporters and mobile journalists can serve this requirement, a quick on-site

presence is not always feasible due to access or distance/time difficulties that might cause unwanted delays and poor capturing quality. To face these demands, Drone Journalism (DJ) uses Unmanned Aerial Vehicles (UAVs)/drones to help journalists and news organizations capture and share breaking news stories. The current paper envisions a DJ framework to mediate real-time breaking news coverage, introducing a data retrieval and semantics preprocessing approach to detect and classify news events suitable for DJ coverage. Based on this, breaking news alerts/notifications are sent to drone operators along with automated preparations of flight plans, embodying the existing regulatory framework, security, and ethical matters. Backend implementation and pilot evaluation of the proposed system are conducted, with a modular architecture facilitating the integration of news alerts sent by mobile devices, elaborating on the inherent localization and networking capabilities to extract time-, location-, and context-aware semantic metadata. The pilot results and the received feedback rated the proposed approach useful in providing the contextual and spatiotemporal attributes of breaking news, with a more holistic coverage of the events offered by combining diverse drone footage and UGC mobile streams (Contribution 5).

The sixth paper addresses the fields of art and culture, some of the most eager to integrate with the Semantic Web since metadata, data structures, linked (open) data, and other building blocks of this Web of Things are considered essential in cataloging and disseminating art- and culture-related content (e.g., the Getty vocabularies project and the Europeana initiative) [35]. Giannakoulopoulos et al. (2022), motivated by the constantly evolving nature of art, which is the subject of many journalist blogs and websites, proceeded to investigate the use of Semantic Web technologies in media outlets that diffuse art- and culture-related content. The study formulates quantitative metrics to evaluate Semantic Web integration in art and culture media outlets, analyzing the impact of that integration on websites' popularity in the modern competitive landscape of the Web. A vast array of art-related media outlets was investigated, ranging greatly in size and popularity, based on a variety of metrics that were consolidated into a comprehensive integration rating. Consequently, the connection between Semantic Web integration and popularity was analyzed through a gradient boosting analysis. They conclude that studying and analyzing the tangible presence of the Semantic Web are vital steps to monitor its progress and stay on course to achieve its true potential, which, so far, remains largely untapped. Apart from its importance in art and culture media, the conducted research methodology and practical implementation may be extended to multiple topics/domains and broader multidisciplinary collaborations in the news and media industries, where semantic services are expected to have a highly positive impact (Contribution 6).

The seventh paper focuses on the development of a computer-supported toolbox with online functionality for assisting technically inexperienced users (journalists or the public) in visually investigating the consistency of audio streams to detect potential interventions coupled with disinformation [29]. Vryzas, Katsaounidou, Vrysis, Kotsakis, and Dimoulas (2022) elaborated on previous research [37,38] to set an audio forensics web environment (which is very limited), emanating on the photo/image forensics examples (and their offered functionalities), with multiple related platforms being already available online [39]. The proposed framework incorporates several algorithms on its backend implementation, including a novel CNN model that performs a Signal-to-Reverberation ratio (SRR) estimation with a mean square error of 2.9%. Hence, it is, for instance, feasible to monitor the conditions of the sound-capturing site (i.e., the "room acoustics") to detect recording inconsistencies and possible audio tampering. Users can access the application online to upload the audio/video file (or YouTube link) they want to inspect audio-wise. Then, a set of interactive visualizations are generated as outcomes of Digital Signal Processing and Machine Learning models, facilitating audio continuity and consistency evaluation. Users can evaluate the authenticity of the dataset samples, with files stored in the database supplemented by analysis results and crowdsourced annotations. Audio semantics bring added value to audiovisual forensics and multimedia disinformation detection, featuring lighter processing (compared to video) with the sound's inherent continuity (i.e., the sound

is always present in a recording, regardless of the microphone steering and the camera's viewing angle). Pilot evaluation results validated the usefulness of the aimed functionality, also considering that very few related applications exist (Contribution 7).

The eighth paper also focuses on the online misinformation problem, introducing a tool for analyzing the social web and gaining insights into communities that drive misinformation online [27]. More specifically, Papadopoulou et al. (2022) present the MeVer NetworkX analysis and visualization tool, which helps users delve into Social Media conversations, gaining insights about how information propagates and accumulating intuition about communities formed via interactions. The multidisciplinary contribution of MeVer lies in its easy navigation through a multitude of features, providing valuable insights about the account behaviors and data propagation in Online Social Networks, i.e., Twitter, Facebook, and Telegram graphs, while also encompassing the modularity to integrate more platforms. Four Twitter datasets related to COVID-19 disinformation were utilized to present the tool's functionalities and evaluate its effectiveness. As the authors conclude, to the best of their knowledge, MeVer stands as the only tool supporting the analysis of multiple platforms and even providing cross-platform investigations, aiming at facilitating the demanding work of journalists and fact checkers to combat disinformation. The presented use cases utilizing the advanced functionalities offered by the tool validated the usefulness and impact of the approach. For instance, aggregation and visualization capabilities provide easy ways to navigate large graphs without special knowledge. Hence, the crafted functionalities usher in semi-automatic procedures that increase productivity, promote cooperation, and save time, making the tool applicable even to average users (Contribution 8).

The ninth paper emphasizes aesthetic trends and Semantic Web adoption of media outlets, as identified through automated archival data extraction and analysis processes [36]. Lamprogeorgos, Pergantis, Panagopoulos, and Giannakouloupoulos (2022) employed various web data extraction techniques to collect current and archival information from popular news websites in Greece to monitor and record their progress through time. Specifically, HTML source code and homepage screenshots were collected for a large number of websites (the top 1000 online media outlets based on Web traffic) using automated archival data extraction techniques to investigate the evolution of their homepage throughout different time instances for two decades. This gathered information was used to identify Semantic Web integration trends, Document Object Model (DOM) structure complexity, number of graphics, color usage, and more. The identified trends were analyzed and discussed as a means to gain a better understanding of the ever-changing presence of the media industry on the Web, with the evolution of Semantic Web technologies proving to be rapid and extensive in online media outlets. Furthermore, website structural and visual complexity presented a steady and significant positive trend, accompanied by increased adherence to color harmony. In conclusion, the study underlines the constantly evolving World Wide Web, influenced both by the rise and fall of technologies and by the continuous changes in human nature through cultural trends, global events, and globalization in general. The conducted study and its novel methods can be extended to provide valuable knowledge pertaining not only to the present but hopefully preparing us for the future. In the end, tracing the advancements of the Semantic Web and the aesthetic evolution of user interfaces can be valuable tools at the disposal of every online media outlet (Contribution 9).

The tenth paper deploys an experimental approach to model and validate a news recommending system (NRS) in a mainstream medium-sized news organization [32]. Spyridou, Djouvas, and Milioni (2022) examined the performance of a ready-to-use (of the shelf) NRS application by observing its outputs. Specifically, using an experimental design entailing users as system testers, the authors analyzed the composition of the personalized MyNews area on the basis of accuracy and user engagement. Addressing the development of algorithms for news media that differ from other media offerings in terms of their civic role, a two-fold aim was pursued: first, to identify the implicated parameters and discover the underlying algorithmic functionality, and second, to evaluate, in practice,

the NRS efficiency through the deployed experimentation. Results indicate that while the algorithm manages to adapt between different users based on their past behavior, overall it underperforms due to flawed design decisions rather than technical deficiencies. The requirement to populate the personalized agenda with a large number of news items, the imperative of recency, the problem of unsystematic tagging and the underuse of available content reduced the capacity of the algorithm to offer a successful personalized agenda. As an outcome, the study offers insights to guide/improve NRS design, considering the production capabilities of the news outlets while supporting their business goals along with users' demands and journalism's civic values. Despite not being a core technological work, this research offers valuable feedback for developing and implementing content recommendation algorithmic solutions for news offering (Contribution 10).

The eleventh paper approaches the current issue from the perspective of interactivity and chatbots, which started infiltrating the media sphere [33]. More precisely, Kotenidis, Vryzas, Veglis, and Dimoulas (2022) focused on new/innovative ways offered by chatbots to news outlets in creating and sharing their content, with an even larger emphasis on back-and-forth communication and news-reporting personalization. The research highlights two important factors to assess the integration efficiency of chatbots in professional journalism. Firstly, the chatbot programming feasibility by plenary individuals without technological background (journalists and media professionals in the current scenario) using low-code platforms. Secondly, the usability of the crafted chatbot news-reporting agents, as perceived by the targeted audience (broader news consumers). Hence, today's most popular chatbot creation platforms are analyzed and assessed within a three-phase evaluation framework. First, the offered interactivity features are evaluated within an appropriate metrics framework. Second, a two-part workshop is conducted with journalists operating the selected platforms (with minimum training) to create their chatbot agents for news reporting. Third, the crafted chatbots are evaluated by a larger audience concerning the usability and overall user experience. The study found that all three platforms received positive evaluations, with high usefulness and usability scores. Professional journalists expressed their confidence in using the suggested platforms for chatbot design, which implies an important attitude change, given that attendees were either unaware or skeptical before the experimental process and the quick guiding. Thus, chatbots are, in fact, suitable for achieving some of the wanted media automations, without requiring prior knowledge of semantic web technologies (Contribution 11).

Based on the provided insights and inspired by [16], an overview of the works included in the Special Issue is presented in Figure 1, mapping their role and contribution across a generic end-to-end model of semantic media services and automations. The discussed topics and the associated solutions are depicted with their future extensions, thus forming a holistic vision encompassing important milestones of adopting Web 3.0 technology (and beyond) in the media industry. Among others, the diagram projects the relation and complementarity of the eleven scientific contributions (C_i) to the different model phases and functionalities. Hence, the research works included in this Special Issue are highly representative, appropriately demonstrating the main processes of the end-to-end chain. Nevertheless, future multidisciplinary research and collaborations are also highlighted and anticipated, augmenting the outcomes and the impact of the current "Future Internet Special Issue *Theory and Applications of Web 3.0 in the Media Sector*".

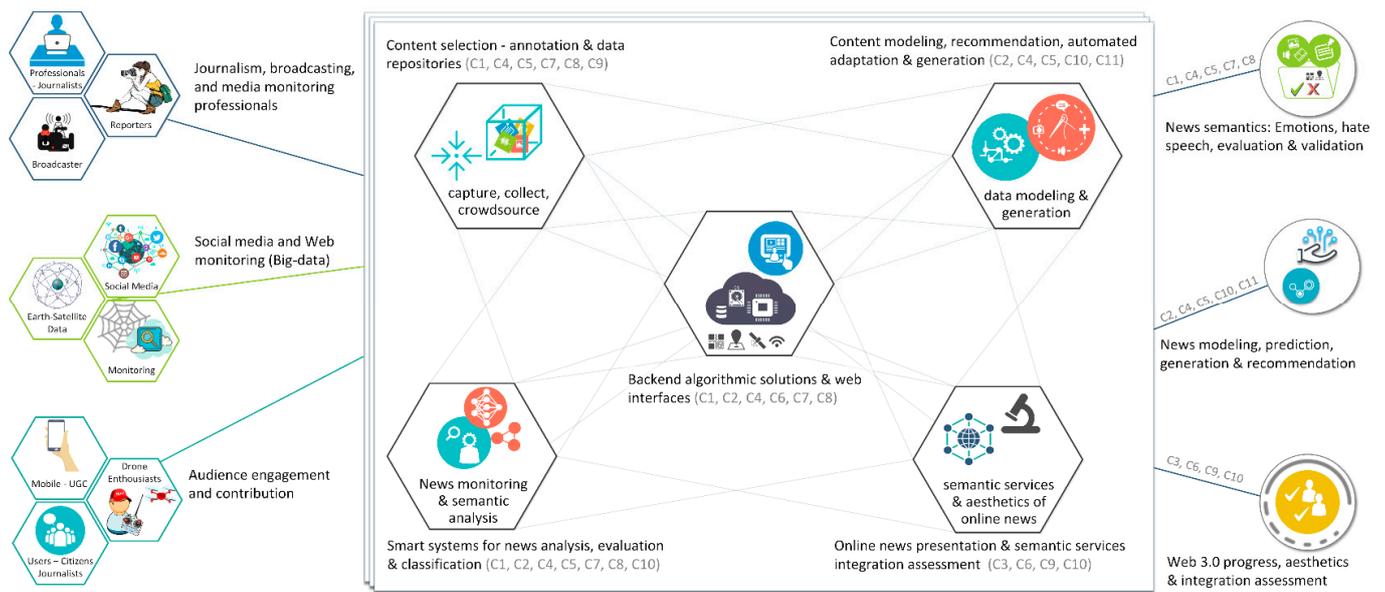


Figure 1. Future Internet volume on *Theory and Applications of Web 3.0 in the Media Sector*: a generic end-to-end model embodying the discussed topics/solutions and a generic one [16].

Table 2 lists all eleven (11) contributions incorporated in this Special Issue with their associated citations.

Table 2. List of contributions with their associated citations.

Contribution 1 (C1) [12]	Vrysis, L.; Vryzas, N.; Kotsakis, R.; Saridou, T.; Matsiola, M.; Veglis, A.; Arcila-Calderón, C.; Dimoulas, C. A Web Interface for Analyzing Hate Speech. <i>Future Internet</i> 2021 , <i>13</i> , 80. https://doi.org/10.3390/fi13030080
Contribution 2 (C2) [31]	Theodorou, T.-I.; Zamichos, A.; Skoumperdis, M.; Kougioumtzidou, A.; Tsolaki, K.; Papadopoulos, D.; Patsios, T.; Papanikolaou, G.; Konstantinidis, A.; Drosou, A.; Tzovaras, D. An AI-Enabled Stock Prediction Platform Combining News and Social Sensing with Financial Statements. <i>Future Internet</i> 2021 , <i>13</i> , 138. https://doi.org/10.3390/fi13060138
Contribution 3 (C3) [34]	Peña-Fernández, S.; Casado-del-Río, M.Á.; García-González, D. From Rigidity to Exuberance: Evolution of News on Online Newspaper Homepages. <i>Future Internet</i> 2021 , <i>13</i> , 150. https://doi.org/10.3390/fi13060150
Contribution 4 (C4) [19]	Tsourma, M.; Zamichos, A.; Efthymiadis, E.; Drosou, A.; Tzovaras, D. An AI-Enabled Framework for Real-Time Generation of News Articles Based on Big EO Data for Disaster Reporting. <i>Future Internet</i> 2021 , <i>13</i> , 161. https://doi.org/10.3390/fi13060161
Contribution 5 (C5) [18]	Niarchos, M.; Stamatiadou, M.E.; Dimoulas, C.; Veglis, A.; Symeonidis, A. A Semantic Preprocessing Framework for Breaking News Detection to Support Future Drone Journalism Services. <i>Future Internet</i> 2022 , <i>14</i> , 26. https://doi.org/10.3390/fi14010026
Contribution 6 (C6) [35]	Giannakouloupoulos, A.; Pergantis, M.; Konstantinou, N.; Kouretsis, A.; Lamprogeorgos, A.; Varlamis, I. Estimation on the Importance of Semantic Web Integration for Art and Culture Related Online Media Outlets. <i>Future Internet</i> 2022 , <i>14</i> , 36. https://doi.org/10.3390/fi14020036
Contribution 7 (C7) [29]	Vryzas, N.; Katsaounidou, A.; Vrysis, L.; Kotsakis, R.; Dimoulas, C. A Prototype Web Application to Support Human-Centered Audiovisual Content Authentication and Crowdsourcing. <i>Future Internet</i> 2022 , <i>14</i> , 75. https://doi.org/10.3390/fi14030075
Contribution 8 (C8) [27]	Papadopoulou O., Makedas T., Apostolidis L., Poldi F., Papadopoulos S., Kompatsiaris I. MeVer NetworkX: Network Analysis and Visualization for Tracing Disinformation. <i>Future Internet</i> . 2022; 14(5):147. https://doi.org/10.3390/fi14050147
Contribution 9 (C9) [36]	Lamprogeorgos, A.; Pergantis, M.; Panagopoulos, M.; Giannakouloupoulos, A. Aesthetic Trends and Semantic Web Adoption of Media Outlets Identified through Automated Archival Data Extraction. <i>Future Internet</i> 2022 , <i>14</i> , 204. https://doi.org/10.3390/fi14070204
Contribution 10 (C10) [32]	Spyridou, P.; Djouvas, C.; Milioni, D. Modeling and Validating a News Recommender Algorithm in a Mainstream Medium-Sized News Organization: An Experimental Approach. <i>Future Internet</i> 2022 , <i>14</i> , 284. https://doi.org/10.3390/fi14100284
Contribution 11 (C11) [33]	Kotenidis, E.; Vryzas, N.; Veglis, A.; Dimoulas, C. Integrating Chatbot Media Automations in Professional Journalism: An Evaluation Framework. <i>Future Internet</i> 2022 , <i>14</i> , 343. https://doi.org/10.3390/fi14110343

3. Conclusions

With the complete digitalization of the end-to-end media processes, the interest has shifted to automating content production, distribution, and management. The so-called Semantic Web services are already present in the media industry, facilitating the works of both professional journalists and the broader news-consuming audience through the offered functionalities of automatic news/data generation, adaptation/personalization, recommendation, and retrieval. Representative works published in this Special Issue verified that notable progress has been made, with significant ongoing multidisciplinary research focusing on the domains of journalism and media, encompassing multiple angles (technological, algorithmic, journalistic, communicational, social, pedagogical, etc.). Nevertheless, further research needs to be conducted for the transition to the new media environment to be completed.

In today's highly diversified and ubiquitous society, where vast volumes of data and inforamatory streams are uncontrollably distributed among multiple networking terminals, users, and communities, critical processes of data evaluation and management need to be supported by technological means and addressed through interdisciplinary approaches. The portrayed conclusions also line up that people and broader society should not be defensive towards upcoming technologies and services that they are currently unaware and skeptical of but, instead, should be willing to become actively involved in the conducted evolutions from which they can only earn knowledge, skills, and digital literacy. Previous experience has shown whatever (media) tools are helpful to the targeted users will prevail in the end, no matter what, with the critical question shifting to how quickly and efficiently an optimal and fair configuration can be reached. Hence, a cooperative spirit among multiple disciplines is necessary to most appropriately shape these new trends to benefit our societies and democracies, i.e., serving the citizens' rights for objective, timely, and reliable news informing, also aligning with the broader civic values of journalism.

Data Availability Statement: Data supporting this article can be found in the listed contributions and their associated Data Availability Statements.

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References

1. Katsaounidou, A.; Dimoulas, C.; Veglis, A. *Cross-Media Authentication and Verification: Emerging Research and Opportunities*; IGI Global: Hershey, PA, USA, 2018.
2. Siapera, E.; Veglis, A. *The Handbook of Global Online Journalism*; John Wiley & Sons: Hoboken, NJ, USA, 2012.
3. Saridou, T.; Veglis, A. Exploring the Integration of User-Generated Content in Media Organizations through Participatory Journalism. In *Encyclopedia of Information Science and Technology*, 5th ed.; IGI Global: Hershey, PA, USA, 2021; pp. 1152–1163.
4. Matsiola, M.; Dimoulas, C.A.; Kalliris, G.; Veglis, A.A. Augmenting User Interaction Experience through Embedded Multimodal Media Agents in Social Networks. In *Information Retrieval and Management*; IGI Global: Hershey, PA, USA, 2018; pp. 1972–1993.
5. Diakopoulos, N. *Automating the News: How Algorithms are Rewriting the Media*; Harvard University Press: Harvard, UK, 2019.
6. Diakopoulos, N. Computational News Discovery: Towards Design Considerations for Editorial Orientation Algorithms in Journalism. *Digit. J.* **2020**, *8*, 945–967. [[CrossRef](#)]
7. Thurman, N.; Lewis, S.; Kunert, J. Algorithms, Automation, and News. *Digit. J.* **2019**, *7*, 980–992. [[CrossRef](#)]
8. Thurman, N.; Schifferes, S. The Future of Personalization at News Websites. *J. Stud.* **2012**, *13*, 775–790. [[CrossRef](#)]
9. Dimoulas, C.A.; Veglis, A.A.; Kalliris, G.; Khosrow-Pour, D.M. Semantically Enhanced Authoring of Shared Media. In *Encyclopedia of Information Science and Technology*, 4th ed.; IGI Global: Hershey, PA, USA, 2018; pp. 6476–6487.
10. Saridou, T.; Veglis, A.; Tsiapas, N.; Panagiotidis, K. Towards a Semantic-Oriented Model of Participatory Journalism Management. Available online: https://coming.gr/wp-content/uploads/2020/02/2_2019_JEICOM_SPissue_Saridou_pp.-27-37.pdf (accessed on 18 March 2021).
11. Vryzas, N.; Sidiropoulos, E.; Vrysis, L.; Avraam, E.; Dimoulas, C. Machine-assisted reporting in the era of Mobile Journalism: The MOJO-mate platform. *Strategy Dev. Rev.* **2019**, *9*, 22–43.
12. Vrysis, L.; Vryzas, N.; Kotsakis, R.; Saridou, T.; Matsiola, M.; Veglis, A.; Arcila-Calderón, C.; Dimoulas, C. A Web Interface for Analyzing Hate Speech. *Future Internet* **2021**, *13*, 80. [[CrossRef](#)]
13. Sidiropoulos, E.; Vryzas, N.; Vrysis, L.; Avraam, E.; Dimoulas, C. Growing Media Skills and Know-How in Situ: Technology-Enhanced Practices and Collaborative Support in Mobile News-Reporting. *Educ. Sci.* **2019**, *9*, 173. [[CrossRef](#)]

14. Stamatiadou, M.E.; Thoidis, I.; Vryzas, N.; Vrysis, L.; Dimoulas, C. Semantic Crowdsourcing of Soundscapes Heritage: A Mojo Model for Data-Driven Storytelling. *Sustainability* **2021**, *13*, 2714. [[CrossRef](#)]
15. Cammaerts, B. Radical pluralism and free speech in online public spaces. *Int. J. Cult. Stud.* **2009**, *12*, 555–575. [[CrossRef](#)]
16. Dimoulas, C.A. Cultural Heritage Storytelling, Engagement and Management in the Era of Big Data and the Semantic Web. *Sustainability* **2022**, *14*, 812. [[CrossRef](#)]
17. Pileggi, S.F.; Fernandez-Llatas, C.; Traver, V. When the Social Meets the Semantic: Social Semantic Web or Web 2.5. *Future Internet* **2012**, *4*, 852–864. [[CrossRef](#)]
18. Niarchos, M.; Stamatiadou, M.E.; Dimoulas, C.; Veglis, A.; Symeonidis, A. A Semantic Preprocessing Framework for Breaking News Detection to Support Future Drone Journalism Services. *Future Internet* **2022**, *14*, 26. [[CrossRef](#)]
19. Tsourma, M.; Zamichos, A.; Efthymiadis, E.; Drosou, A.; Tzovaras, D. An AI-Enabled Framework for Real-Time Generation of News Articles Based on Big EO Data for Disaster Reporting. *Future Internet* **2021**, *13*, 161. [[CrossRef](#)]
20. Dörr, K.N. Mapping the field of Algorithmic Journalism. *Digit. J.* **2015**, *4*, 700–722. [[CrossRef](#)]
21. Panagiotidis, K.; Veglis, A. Transitions in Journalism—Toward a Semantic-Oriented Technological Framework. *J. Media* **2020**, *1*, 1. [[CrossRef](#)]
22. Vryzas, N.; Vrysis, L.; Dimoulas, C. Audiovisual speaker indexing for Web-TV automations. *Expert Syst. Appl.* **2022**, *186*, 115833. [[CrossRef](#)]
23. Vryzas, N.; Tspas, N.; Dimoulas, C. Web Radio Automation for Audio Stream Management in the Era of Big Data. *Information* **2020**, *11*, 205. [[CrossRef](#)]
24. Touri, M.; Kostarella, I. News blogs versus mainstream media: Measuring the gap through a frame analysis of Greek blogs. *Journalism* **2017**, *18*, 1206–1224. [[CrossRef](#)]
25. Kostarella, I.; Kotsakis, R. The Effects of the COVID-19 “Infodemic” on Journalistic Content and News Feed in Online and Offline Communication Spaces. *J. Media* **2022**, *3*, 471–490. [[CrossRef](#)]
26. Tspas, N.; Vrysis, L.; Konstantoudakis, K.; Dimoulas, C. Semi-supervised audio-driven TV-news speaker diarization using deep neural embeddings. *J. Acoust. Soc. Am.* **2020**, *148*, 3751–3761. [[CrossRef](#)]
27. Papadopoulou, O.; Makedas, T.; Apostolidis, L.; Poldi, F.; Papadopoulos, S.; Kompatsiaris, I. MeVer NetworkX: Network Analysis and Visualization for Tracing Disinformation. *Future Internet* **2022**, *14*, 147. [[CrossRef](#)]
28. Veglis, A.; Saridou, T.; Panagiotidis, K.; Karypidou, C.; Kotenidis, E. Applications of Big Data in Media Organizations. *Soc. Sci.* **2022**, *11*, 414. [[CrossRef](#)]
29. Vryzas, N.; Katsaounidou, A.; Vrysis, L.; Kotsakis, R.; Dimoulas, C. A Prototype Web Application to Support Human-Centered Audiovisual Content Authentication and Crowdsourcing. *Future Internet* **2022**, *14*, 75. [[CrossRef](#)]
30. Kotenidis, E.; Veglis, A. Algorithmic Journalism—Current Applications and Future Perspectives. *J. Media* **2021**, *2*, 244–257. [[CrossRef](#)]
31. Theodorou, T.-I.; Zamichos, A.; Skoumperdis, M.; Kougioumtzidou, A.; Tsolaki, K.; Papadopoulos, D.; Patsios, T.; Papanikolaou, G.; Konstantinidis, A.; Drosou, A.; et al. An AI-Enabled Stock Prediction Platform Combining News and Social Sensing with Financial Statements. *Future Internet* **2021**, *13*, 138. [[CrossRef](#)]
32. Spyridou, P.; Djouvas, C.; Milioni, D. Modeling and Validating a News Recommender Algorithm in a Mainstream Medium-Sized News Organization: An Experimental Approach. *Future Internet* **2022**, *14*, 284. [[CrossRef](#)]
33. Kotenidis, E.; Vryzas, N.; Veglis, A.; Dimoulas, C. Integrating Chatbot Media Automations in Professional Journalism: An Evaluation Framework. *Future Internet* **2022**, *14*, 343. [[CrossRef](#)]
34. Peña-Fernández, S.; Casado-del-Río, M.Á.; García-González, D. From Rigidity to Exuberance: Evolution of News on Online Newspaper Homepages. *Future Internet* **2021**, *13*, 150. [[CrossRef](#)]
35. Giannakouloupoulos, A.; Pergantis, M.; Konstantinou, N.; Kouretsis, A.; Lamprogeorgos, A.; Varlamis, I. Estimation on the Importance of Semantic Web Integration for Art and Culture Related Online Media Outlets. *Future Internet* **2022**, *14*, 36. [[CrossRef](#)]
36. Lamprogeorgos, A.; Pergantis, M.; Panagopoulos, M.; Giannakouloupoulos, A. Aesthetic Trends and Semantic Web Adoption of Media Outlets Identified through Automated Archival Data Extraction. *Future Internet* **2022**, *14*, 204. [[CrossRef](#)]
37. Vryzas, N.; Katsaounidou, A.; Kotsakis, R.; Dimoulas, C.A.; Kalliris, G. Investigation of audio tampering in broadcast content. In Proceedings of the Audio Engineering Society Convention 144, Milan, Italy, 23–26 May 2018.
38. Vryzas, N.; Katsaounidou, A.; Kotsakis, R.; Dimoulas, C.A.; Kalliris, G. Audio-driven multimedia content authentication as a service. In Proceedings of the Audio Engineering Society Convention 146, Dublin, Ireland, 20–23 March 2019.
39. Katsaounidou, A.; Gardikiotis, A.; Tspas, N.; Dimoulas, C. News authentication and tampered images: Evaluating the photo-truth impact through image verification algorithms. *Heliyon* **2020**, *6*, e05808. [[CrossRef](#)]

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