Is it Really Fake? – Towards an Understanding of Fake News in Social Media Communication.

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Abstract. This paper outlines the development of Fake News and seeks to clarify different perspectives regarding the term within Social Media communication. Current information systems, such as Social Media platforms, allow real-time communication, enabling people to produce and spread false information and rumors within a few seconds, potentially reaching a wide audience. This, in turn, could have negative impacts on politics, society, and business. To demystify Fake News and create a common understanding, we analyzed the literature on Fake News and summarized existing articles as well as strategies tested to detect Fake News. We conclude that detection methods mostly perform binary classifications based on linguistic features without providing explanations or further information to the user.

Keywords: Fake News, Fake News Detection, Social Media, Social Media Analysis, Social Media Analytics

1   Introduction

Today, the term "Fake News" is omnipresent and often discussed in both media and research. But to what does it refer to? What kind of information and news are included and where does it come from? The 2016 US presidential election campaign brought maximum attention to the phenomenon of intentionally using false information for political reasons. A famous example is the "Pizzagate" scandal, which was provoked by misinformation shared on Social Media about presidential candidate Hillary Clinton's connection to a child pornography ring acting in a pizzeria that ended up with a shooting [1, 2]. Furthermore, the use and distribution of Fake News discrediting presidential candidate Hillary Clinton is supposed to have influenced the actual election results [1, 2, 3, 4, 5].

Ever since, Fake News has had a profound impact on politics, democracy, society, and economy [6] and the ability to trigger actions, outcomes and consequences, in

particular, if they are spread through Social Media [7, 8]. The issue is maximized by the fact that in the US most of the news consumption takes place through Social Media [8, 9]. Reports also show that among the consumed pieces of information, a vast amount of news is reported by alternative media types which are regarded as a source of misinformation and propaganda due to the loss of commonly held standards regarding mediated information and the absence of easily decipherable credibility cues [10].

In the US, for example, Twitter users reference news reported by alternative media sites as often as news produced by professional news media. The authors report, however, that this was different for EU countries such as the UK, Germany, and France. In these countries, alternative news websites were only referred to five to 12 percent of the time [11]. The emergence of Fake News is additionally fraught with risks while most Americans limit their political participation during elections to sharing memes, pictures, quotes, and statements about their favored candidate [4]. However, the phenomenon of spreading false information is not limited to the US; in Europe, fake stories were published as well, particularly about refugees, refugee policy, and politicians [12].

While researchers have proved the success of Fake News in terms of its distribution and impact on Social Media [2, 6, 7], one question remains unanswered: Why is Fake News successful and why do recipients believe in such misinformation without further fact-checking?

With the radical examples that occurred in the US election, an important issue became how to detect Fake News in Social Media [3]. Facebook founder Mark Zuckerberg emphasized (in a statement on Facebook), that it is important to find "better technical systems to detect what people will flag as false before they do it themselves." But, what methods have already been developed and tested, and what can be improved for the future?

Once Fake News is pervasive, businesses, public institutions, and governments have to react efficiently and quickly to label or delete Fake News published in Social Media and manage the situation [13, 14, 15, 16]. For instance, in June 2017, Germany passed a law ("Netzwerkdurchsetzungsgesetz") [17] that requires the deletion of Fake News within 24 hours. Accordingly, Facebook started a fact-checking collaboration with the research initiative Corrective, which allows users to indicate potentially false news to get it double checked. In addition, Facebook and Google both began to work on improving the detection of Fake News, for instance by optimizing the news feed algorithm or identifying URLs of potential Fake News distributors [18].

However, at this point, we also have to investigate the potential risks of flagging something as Fake News. It is a balancing act not to behave in a manipulative or suggestive way but rather to support recipients of Social Media communication with valid credibility ratings for information posted.

While Fake News is currently an almost-universal topic, and research has already been conducted on this topic, no overview of Fake News and Fake News detection, including underlying psychological mechanisms, exists. Research articles or essays focus either on technical aspects and solutions [2, 19] or highlighting current events [7].

Therefore, we will put the lens on Fake News and seek to understand its origin and emergence by examining its definitions, use, and interpretation in current research articles. Furthermore, we summarize methods and strategies which are already applied

for detecting Fake News and relate them to situational and contextual conditions. We continue by discussing the (potential) limits of Fake News detection and round up our article with a conclusion including recommendations for further research.

2 How is Fake News Defined and Interpreted in the Literature?

There have been many discussions about the definition and meaning of the term Fake News. While the definitions present in the literature have many similarities as to the meaning of the term, the definitions still differ in some respects. One definition by Douglas and colleagues refers to Fake News as a "deliberate publication of fictitious information, hoaxes, and propaganda" [19, p.36]. A similar understanding is stated by Klein and Wueller, who describe Fake News as an "online publication of intentionally or knowingly false statement of fact" [20, p.6], while the publishers of Fake News do not necessarily have to believe that their asserted facts are correct, which outlines the importance of intentionality [6].

Moreover, Allcott and Gentzkow [1] describe Fake News as news articles that are intentionally and verifiably false and mislead the reader. However, they make some exceptions, for instance, accidental errors of reporting, rumors which are not related to an article, conspiracy theories and incorrect political statements. Excluding statements which do not originate from articles illustrates a differentiation between Fake News and rumors. Thus, rumors are seen as information spread through Social Media which are unverified at the time of publication [21, 22], such as in crisis situations [23, 24, 25]. An excellent review regarding rumors and related issues is provided by Zubiaga et al. [21].

However, the importance of the intention to deceive is underlined by deliberately factoring out mistakes which occur by ignoring a lack of verification of information sources [26]. To be precise, this indicates the differentiation between misinformation and disinformation. Misinformation refers to false information that is not intentionally inaccurate, but rather a result of misinterpretation or a lack of source verification. In contrast, disinformation is used to describe content that is fabricated to be misleading [27].

Some authors focus more on the financial aspect of distributing false information. According to Silverman [28], Fake News is thoroughly false information solely created for financial gain to boost attention. This form of misinformation is referred to as click-baiting, which is applied to achieve financial goals by publishing attention-grabbing, misleading headlines to increase traffic to a connected website. Klein and Wueller [20] concur with that point of view. They state that false facts are typically published on websites and spread on Social Media for profit or social influence.

Another point of discussion is satire. On the one hand, it can be regarded as a form of Fake News which is accepted as accurate by many observers [29]. On the other hand, satirical websites use humor and exaggeration to criticize social and political issues, so

the primary intention is not to make the public believe their news is accurate [20]. However, most of the authors exclude satire from the Fake News category, because it is not produced to achieve financial or political benefits [5].

Besides a lack of the factual basis in news stories, Berghel [2] presented typical characteristics to indicate Fake News; these include hidden or blurred authorship or imprint and the use of account names which sound similar to recognized news portals. Moreover, McClain adds that Fake News stories try "to imitate the style and appearance of real news articles" [30, p.1].

In sum, Fake News is described as news articles that contain false, discrediting or whitewashed information with the intention to manipulate and deceive recipients. Publication of such false information is mainly motivated by financial or political interests [1, 22, 31] and spreading is accelerated by the popularity of Social Media sites.

3 Where Does Fake News Come From?

In recent years, the usage of Social Media platforms has grown tremendously, leading to a change in peoples' work and lives and resulting in increased online human interaction. Due to the development of Social Media, users are not only able to consume information, they can produce and share content [32, 33]. Furthermore, mass media no longer functions as a gatekeeper of information [1]. This results in more opportunities for content production as well as reaching a potentially broad audience using informal and privately hosted Social Media channels.

In general, Social Media provides a communication space without gatekeepers, filtering options, or the control for quality standards, so not only private users can produce content and information, but also groups, organizations, parties, and politicians [34]. These preconditions can lead to the publication or sharing of information that is not validated and potentially untrue [2] and because of this able to negatively impact users' perceptions and opinions.

Fake News, which reflect the negative side of Social Media communication, is gaining significant popularity nowadays [1, 2, 35]. However, manipulating information is not a new phenomenon. It is currently receiving attention [2, 20] because of its accelerated means to share and distribute intentionally faked content. But, with a detailed look at the history and context of false information in the media, it can be stated that the use of false information took place for a long time. Historical examples indicate that people have always manipulated information and stories to achieve specific goals. For instance, one famous example from the past was the so-called "Great Moon Hoax", a series of articles describing the existence of human beings on the moon and published by the New York Sun in 1835 to increase the paper's circulation [1, 27, 35].

In later years, the term Fake News was used to refer to comedic programs engaging in political satire [36] or general parodies of professional news [37]. Broussard described Fake News as an outcome of combining entertainment and information in media content, thus creating a third genre called "infotainment." The researcher also

stressed that Fake News could help audiences understand complex political information through the humorous way it was presented [38].

Due to the rise of Social Media platforms, the term Fake News has gone through a substantial transformation [36]; it is now commonly seen as a form of misinformation that benefits from the fast pace of information dissemination on social networks [39]. This refers to the versatile possibilities to share content on Social Media through the connected structure of the network. Furthermore, site vendors encourage the spread of information by allowing users to broadcast content to their personal networks using a single mouse click. Combined with the ubiquitous mobile accessibility of Social Media applications, the rate of information distribution through Social Media is considerable.

Consequently, a "new political and cultural climate" [30, p.1] arose in which the prevalence of Fake News and alternate facts grew significantly. With the US elections at the end of 2016 and the frequent use of manipulated news stories as a powerful part of the campaign strategy [1, 2, 3, 4, 5], Fake News has achieved great public interest [35].

Apparently, false information with the intent to manipulate recipients has long been used. Nowadays, the engaging features of Social Media, namely the ease of sharing content and social connections, have become main reasons for an increased emergence of Fake News [39].

4   Why do Recipients Believe Fake News?

The important role of Social Media is supported by the fact that many people use it as their only source of news and political information [30] without utilizing professionally edited media, such as newspapers and magazines [40]. This results in an immense impact of (false) information spread on Social Media.

Besides, not turning to traditional information sources makes recipients more vulnerable to manipulation. The logic of social networks includes high connectivity, whereby faked content can quickly go viral by receiving thousands of likes and shares [26]. This, in turn, can create a potentially misleading impression of trust in a piece of information.

The preconditions of Social Media - everyone can produce content at any time - lead to vast amounts of information. Users are unable to process everything in an elaborated way, because they are confronted with information overload and limited cognitive capacities [41, 42]. Social Media communication, in general, was found to be processed more peripherally [43]. Accordingly, recipients are possibly guided by simple heuristic rules, for instance, applying the Bandwagon heuristic, described as "If others think that something is good, then I should, too" [44, p.83]. This implicit rule was already found to be influential for ratings and reviews in e-commerce [45] and could possibly serve as explanation for why recipients believe in Fake News if it is shared and liked a lot by others.

In line with this, Pennycook and colleagues [6] revealed that recipients' tendency to rely on Fake News is strengthened by perceptions of familiarity due to prior exposure.

Due to high connectivity, current articles are widely distributed in Social Media by sharing and liking activities of members of individuals' personal networks, which also leads to potential repeated receptions. Through these repetitions, recipients tend to be guided by the rule "I saw this before so its probability true" [6, p.8]. This process probably takes place unconsciously, since explicit warnings did not change this behavior. Additionally, Fake News headlines which have been presented before were rated as more credible, even combined with a warning message, compared to Fake News headlines which were viewed for the first time and not accompanied by a warning.

Moreover, if users believe that a website or news account is journalistic, they are easily persuaded and believe everything stated by this source [35]. Often, Fake News producers exploit this by employing credible-sounding names for the Fake News sources like *CNN_politics* or *The Denver Guardian* or by using an article design which is derived from journalistic sources [6]. Another example is a faked Twitter account with the name of former New York mayor Giuliani [5]. It is intricate for the recipients to identify the account as fake, so that source and message are mainly perceived as credible due to the supposed reputation of the account.

A further aspect refers to the tendency that people are striving for consistency in their attitudes, behavior, and self-perception and thus favor information which is in line with their opinions. Psychological mechanisms like cognitive dissonance theory and belief disconfirmation paradigm [46] state that persons, who are confronted with conflicting news, perceive feelings of stress, which often result in a rejection of the conflicting information to defend and justify their prior beliefs. This behavior can be transferred to Social Media consumption as users prefer to receive information that confirms already existing views [39] and mostly avoid conflicting information. This behavioral pattern is strengthened by technical features of Social Media applications. For instance, Facebook uses filtering and search algorithms that limit users' news feed content to previously consumed topics. Similar techniques are applied in other networks and other contexts. As a result, filter bubbles are created, wherein users only read and share information they already believe in. Due to this so-called confirmation bias, malformed worldviews and echo chambers can be formed even when the disinformation is disproved [4, 47].

It is a crucial finding that the identification and correction of false information do not necessarily change peoples' beliefs because they have already made up their minds. According to Berghel, since a Fake News story is posted online, "the story already had legs" [2, p. 82]. As a correction or deletion of manipulated content can even backfire and entrench users in their initial beliefs [39], it is difficult to assess how to deal with identified Fake News stories and which strategy could be used to present it to the users efficiently.

Since Fake News often appeals to emotions instead of being supported by evidence or facts, it is even easier for users to rely on this kind of information because less cognitive effort is needed to make a judgment or form an opinion on something. As outlined earlier, the 2016 US elections played an important role in the development and transformation of today's understanding of Fake News. It has been found that for the voters in the elections (especially those who voted for Donald Trump), verifiable and reliable

facts get outweighed by emotional headlines and news [48]. Taken together, the emotional impact of Fake News should not be disregarded in the discussion.

5 What Strategies can be Used to Detect Fake News?

As mentioned before, it is imperative for governments, public institutions and businesses to detect Fake News. In our article, we highlight two existing ways for detecting Fake News. The identification of false information can either be tackled by manual efforts based on experts or crowd knowledge, or by using automated approaches to identify check-worthy claims and perform a veracity check [49]. For the first approach, Social Media users can be involved by being asked to flag all potentially Fake News articles to be checked later by journalists or research organizations such as Corrective in Germany.

Naturally, manual Fake News detection is mostly unfeasible or at least time consuming due to the vast amount of content generated on Social Media. Therefore, automated approaches are more suited for the task of detecting Fake News systematically. These approaches can be categorized by their primary features' sources, i.e., some approaches rely on linguistic cues, while others perform network analyses to detect behavioral patterns. In either method, after feature extraction, machine learning algorithms are used to tackle the problem. In fact, they indicate if something is fake or factual news based on the features. In the following examples of automated Fake News detection, concepts taken from the literature are reviewed and discussed. Note that our review is short and aims to give just a taste regarding approaches to tackle the problem automatically.

By using linguistic features to classify scientific publications into fraudulent or genuine material, Markowitz and Hancock reached an accuracy rate of 71.4 percent [50]. The most descriptive features in the discussed dataset were found to be adjective, amplifier, and diminisher as well as certainty term frequencies. Identified relevant features are also found to be useful in fake review detection as well as in research related to reality monitoring. Hardalov et al. [26] used a combination of linguistic, credibility and semantic features to determine real from Fake News. Linguistic features in their work include (weighted) n-grams and normalized number of unique words per article. Credibility features were adopted from the literature and included capitalization, punctuation, pronoun usage and sentiment polarity features generated from lexicons. Text semantics were analyzed using embedding vectors trained on DBPedia. All feature categories were tested independently and in combination based on self-created datasets. In two out of three cases, the best performance was achieved using all available features.

Besides using linguistic or contextual features to detect false information, argumentation and textual structure can be used for the analyses. Lendavi and Reichel [51] investigated how contradictions in rumorous sequences of micro-posts can be detected by analyzing posts at the level of text similarity only. The authors argue that vocabulary and token sequence overlap scores can be used to generate cues to veracity assessment, even for short and noisy texts. In addition, Ma et al. [52] expanded on previous work by observing changes in linguistic properties of messages over the lifetime of a rumor.

Using SVM (support vector machine) based on time series features, they were able to show reasonable success in the early detection of an emerging rumor.

Another approach is presented by Conroy et al., [31] who argue that the best results in Fake News detection could be achieved by combining linguistic and network features. This is because in the literature, both feature categories are used in topic-specific studies.

To utilize the information provided by knowledge networks like DBPedia, Ciampaglia et al. [18] continued with the proposition to map the fact-checking task to the well-known task of finding the shortest path in a graph. In that case, a shorter path indicates a higher probability of a truthful statement. It should be noted that the latter approach is limited by the requirement that the knowledge graph must include the topic in question. In the case of emerging topics, that requirement will hardly ever be met in practice. However, methods used for Fake News detection are highly dependent on the specific case and related conditions. So, currency, time, duration and topic area have to be considered when selecting the method.

A further feature which could be exploited are pictures accompanying a piece of information. Accordingly, Jin et al. [49] include news articles' images in the Fake News detection process. Based on a multimedia dataset, the authors explore various visual and statistical image features to predict respective articles' veracity. Promising results were achieved by comparing the distance of a set of event-related images to the general set containing images of all events. Moreover, within another research project, Jin et al. [53] proposed a Fake News detection method utilizing the credibility propagation network built by exploiting conflicting viewpoints extracted from tweets.

Some factors that come with news articles are not yet extensively included in strategies for Fake News identification. In this line, Shu at al. [54] state that social context features of news articles are underused in Fake News detection in Social Media. These features are categorized as user-based, referring to characteristics of the user profile like number of followers, followings, or postings, post-based, which includes postings related to the Fake News article, and network-based, which describes a cluster of user groups depending on their reaction to the article or their relationships with each other (e.g., the following structure). The authors advise researchers to consider those features appropriately when performing Fake News detection.

Table 1 summarizes the discussed articles and their approaches for detecting Fake News. It is evident that current Fake News detection approaches commonly focus on linguistic features. While these show promising results in their respective domains, other feature categories are underused in the literature. The network's structure could be used to detect spreading patterns of Fake News and include temporal information to improve prediction accuracy. In domains where multimedia content is prevalent, the analysis should be extended to include visual features accordingly. Finally, current approaches perform binary Fake News classification only. Future work could explore the possibility of probabilistic classification yielding a Fake News score on a continuous scale.

Table 1. Methods for Fake News detection used in the literature
(* denotes proposition rather than actual application of method)

Author/ Method	Linguistic Features	Semantic Features	Credibility Features	Network Features	Visual and Statistical Image Features	Social Context Features
Markowitz & Hancock (2014)	X					
Hardalov et al. (2016)	X	X	X			
Lendavi & Reichel (2016)	X					
Ma et al. (2015)	X					
Conroy et al. (2015)	X*			X*		
Ciampaglia et al. (2015)				X		
Jin et al. (2017)					X	
Shu et al. (2017)						X*

6 What are Ethical Borders of Fake News Detection?

After the US elections, often seen as the climax of the rise of Fake News and a post-truth age, the call for more observation and control in Social Media came up to optimize the identification of Fake News. However, defining truth and identifying the truthfulness of information is difficult.

One possible approach for defining the truth is to adopt Appleman and Sundar's definition; they refer to the "veracity of the content of communication" [55, p. 63]. In fact, this means if the included information could be proved, the message is true, and if not, it will be labeled as fake. However, it should be considered that even a concept like veracity is situated on a continuum [31] and a binary decision between true or false - as it is performed by today's automated methods - is probably not (always) sufficient. For instance, even if satire and parody do not intentionally deceive recipients, it happens nonetheless, because the content is not clearly and absolutely true [29]. As a result, the

recipient of the information has to be considered as an influencing factor of how information is processed and perceived. Using a strict binary definition for Fake News detection, satire had to be labeled as fake content. However, the effects on society related to flagging or deleting satirical communication and media are unclear. Typically, satire is used for criticizing political events or actions. Removing or blocking this content from the discussion because some recipients are potentially unable to get the joke, understand the message, or double-check the information with other sources has to be considered carefully.

Furthermore, figuring out the author's real intention is probably difficult. How should anyone be able to find out if the author shared false information because he or she misinterpreted the facts or intended to manipulate the audience [27]? From a practical perspective, misinformation and disinformation are not highly selective, and the differentiation is hard to pinpoint using an objective viewpoint.

Overall, there is a balancing act between governmental supervision and freedom of speech and expression [14, 16]. Most authors are quite critical of governmental control over the media, especially when also considering historical examples of misuse. Once media regulation methods are applied, they can also be extended or encroached within a change in government [17].

Regarding potential risks, some articles highlight the importance of strengthening recipients' media competence instead of building up governmental control [17, 19] which would positively contribute to support users in identifying satire as well as false information and getting to know suitable fact-checking methods.

Moreover, Tufekci [56] draws attention to the fact that some Social Media companies like Facebook have a monopoly position concerning insights into data patterns. It would bode well if those companies were to collaborate with researchers to evaluate relationships and samples with the aim of applying measures for optimized Fake News identification. Including researchers and independent organizations would lead to more objectivity in the process. However, given the commercial nature of these networks, making user data accessible to researchers would contradict their core business model. Consequently, legislation is needed for the scientific community to gain a right to access large-scale usage data.

The importance of an appropriate societal debate about this matter is also highlighted in current events. For instance, Facebook has recently been criticized for its selection of Trending Topics (this function is not available in all countries), since conservative news articles seem to be incorporated less frequently. This is possibly caused by an opposite political attitude of the employees of Facebook, who were selecting the articles to appear in this section [3]. Besides potentially unknown biases such as individual perspectives on a controversial topic, financial aspects should be considered, especially in the case of dominant, globally positioned Social Media companies.

Generally, the limitation of expression and publication of opinions and information come along with restricting freedom of speech. Marking postings as fake especially contradicts the idea that Social Media represents a platform where everyone has an opportunity to express opinions and thoughts [3].

7   Conclusion

By summarizing the existing literature, we shed light on the phenomenon of Fake News. Publishing false information (for any purpose) is not a new phenomenon, but contextual conditions, speed of distribution, and potential message range have changed immensely over time. The rise of Social Media enables rapid distribution of information so that the impact of Fake News (information, stories, etc.) has grown. Social Media is increasingly used as the only source for gaining political information and news [40]. At the same time, Fake News has become an influential tool for elections and society, especially since the US elections in 2016 [1]. Considering the negative implications, the importance of detecting and "fighting" Fake News rises continuously.

Several automated detection approaches using standard machine learning techniques have been developed. Most commonly, these approaches perform binary classification that relies on extracting of linguistic features to determine news veracity. However, those methods have been tested in domain-specific datasets only, potentially limiting their generalizability. Furthermore, as was discussed above, a binary classification may be insufficient for real-world applications.

Besides working on technical solutions, psychological factors can be considered to optimize methods for Fake News detection. For instance, Berghel [2] emphasizes the need to present the classification process as well as the reasons for how and why a news story is indicated as fake to the user. This should help in overcoming the unconscious use of heuristic rules. Additionally, users have to learn to not overly rely on account names when judging articles' veracity, as they can easily be fabricated to resemble official news agencies.

Moreover, research in the area of recommender systems showed that people tend to accept recommendations for products more if they were accompanied by explanations [57]. These explanations encompass information including the kind of data a recommendation is based on. Transferred to Fake News detection, explaining to users why a story is faked, which facts are presented wrong, and where they can get further information could be a promising approach along with raised attention, acceptance and trust from the recipient's perspective. Additionally, explanations can support the improvement of the detection process; for example, mistakes could be found more easily.

Overall, the need for developing and applying methods to efficiently detect intentionally published Fake News stories increased with the use of Social Media and potentially unlimited and fast-running possibilities to produce and spread information. Further research is needed to improve practical used mechanisms to overcome existing difficulties like users' reactance, unclear definitions of truth, and ethical considerations around restricting or limiting the extent of user expressions.

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