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**Abstract.** Fake News have become a global phenomenon due to its explosive growth, particularly on social media. How to identify fake news is becoming an extremely attractive working domain. The lack of a sound, well-grounded conceptual characterization of what exactly a Fake news is and what are its main features, makes difficult to manage Fake News understanding, identification and creation. In this research we propose that conceptual modeling must play a crucial role to characterize Fake News content in a precise way. Only clearly delimiting what a Fake News is, it will be possible to understand and managing their different perspectives and dimensions, with the final purpose of developing any reliable framework for online Fake News detection as much automated as possible. This paper discusses the effort that should be made towards a precise conceptual model of Fake News and its relation with an XAI approach.

**Keywords:** Conceptual Modeling · Fake News · Explainable Artificial Intelligence.

## 1 Introduction

Although Fake News is not a new phenomenon [15], questions such as why it has emerged as a global topic of interest and why it is attracting increasingly more public attention are particularly relevant at this time. The leading cause is that Fake News can be created and published online faster and cheaper when compared to traditional news media such as newspapers and television [13]. In addition, recent discussions of higher education's failure to teach students how to identify Fake News have appeared in leading newspapers [9].

In a sound Information Systems Engineering context, a correct data management of Fake News strongly requires a precise conceptual characterization of "what" a Fake News is. If an information structure must represent a conceptualization, the entities that represent that conceptualization must be explicitly determined. Any information system intended to register information about

Fake News must identify in detail what are the relevant entities that conceptually characterize the different dimensions that must be considered to treat Fake News data correctly. Ontologically speaking, a precise ontological commitment that involves the relevant entities that constitute the conceptualization must be stated. This is the contribution that this paper addresses, by facing a fundamental question regarding the terminology and the ontology of Fake News: what constitutes and qualifies as Fake News?

To achieve that goal, in Section 2 we analyze related work to emphasize how ambiguous the concept of Fake News is still in practice, and how difficult is to find a unified view on what exactly a Fake News is. In Section 3, we propose our own classification of Fake News regarding the Information Ecosystem. On the way to propose a conceptual model of Fake News, Section 4 discusses the key notions that must be taken into account when the goal is to provide a sound conceptual characterization of the Fake News notion. This section ends up with a precise definition of Fake News, which in our point of view encompasses the target elements to be represented in a conceptual model. Section 5 highlights some hints on the construction of this conceptual model as an initial building block of an XAI approach.

## 2   Related Work

Many works focus on the study of Fake News. They are mainly interested in understanding and identifying the nature of information in Fake News to better distinguish it from real information. There has been extensive research on establishing a practical and automatic framework for online Fake News detection [21, 20], intended to help online users to identify valuable information.

To develop reliable algorithms for detecting Fake News, an important ingredient is to be able to point very clearly on what is a Fake News or what are the principal features characterizing it. However, what we can notice first in the literature is that the concept of Fake News is still ambiguous, and the boundary between the definition of Fake News and other relative concepts, such as mis-information, des-information, news satire, hoax news, propaganda news, etc., is blurred. Indeed, as it is illustrated by some categorization examples [15, 16, 7], it is not always clear how these different concepts are related. Moreover, several definitions of Fake News have been proposed. For instance, [10] state that Fake News are "Fabricated news articles that could be potentially or intentionally misleading for the readers" , or [13]: " Fake News is a news article that is intentionally and verifiably false". What we can note is that it is difficult to have a consensus and a unified vision on what exactly a Fake News is

More recently, [8] has proposed a first step towards a characterization of Fake News. It is based on seven different types of online content under the label of "Fake News" (false news, polarized content, satire, etc.), in contrast with real news by introducing a taxonomy of operational indicators in four domains. The characterization is interesting, but it is not based on a precise conceptual model. As a representation that captures someone's conceptualization of understand-

ing of a domain, a conceptual model is the natural strategy to get a reliable domain representation that is used by human users to support communication, discussion, negotiations, etc. In the Fake News context, it allows us to define Fake News with specific and precise semantics. Moreover, the conceptual model will expose the relations between the concepts composing Fake News in a more informative and robust way, which will offer a reliable and practical means for detecting or even automatically generating Fake News. In [18] a conceptual model to examine the phenomenon of Fake News is proposed. The model focuses on the relationship between the creator and the consumer of the information, and proposes a mechanism to determine the likelihood that users will share their Fake News with others. In contrast, in our work we are particularly interested in the conceptualization of the Fake News content. A further advantage of relying upon a conceptual model is its ability to facilitate building well-justified and explainable models for Fake News detection and generation, which, to date, have rarely been available. Indeed, as it is emphasized in [21, 19], despite the surge of works around the concept of Fake News, how one can automatically assess news authenticity in an *effective* and *explainable* manner is still an open issue.

We propose here to discuss and to understand what a Fake News is. The idea is to characterize Fake News content to demonstrate what is essential to consider towards building a Conceptual Model. A conceptual understanding of Fake News will help us distinguish them better and rule them from real news.

## 3   Fake News Into the Information Ecosystem

Several concepts are close to the notion of Fake News, and it is not always clear how similar or different they are. Therefore, we propose in Figure 1 an information categorization to situate Fake News and some closer concepts. Our categorization is based on the following observations.

On the one hand, four categories of information differ by their facticity and the author's intention to harm [17]. First, the *journalism* defined as "independent, reliable, accurate, and comprehensive information" by [6]: journalism aims to release information with a high level of facticity without intent to harm. Second, *malinformation* defined as "potentially dangerous or damaging information; inappropriate information; information people feel uncomfortable within openly accessible circulation" [12]. Thus, malinformation possess a high level of facticity released to harm. Third, *disinformation*: "includes all forms of false, inaccurate, or misleading information designed, presented and promoted to cause public harm intentionally or for profit" [4]. Thus, it has a low level of facticity released to harm someone or an institution. Finally, *misinformation* deals with "information that is false, inaccurate or misleading". We note that there is no consensus in the literature about whether the author of misinformation intends to deceive or not. In this paper, misinformation is considered as information that is false, inaccurate or misleading, released without intent to deceive. It is created when a human being misinterprets a piece of information or draw inaccurate conclusions while believing this misinterpretation or conclusion is true. Thus, it is information with a low level of facticity but no intent to harm.

On the other hand, a critical element of information is whether it is true. While journalism and malinformation present genuine information, the notions at hand don't and are consequently part of altered information. In the literature, the term "false information" is often used as opposed to "true information". However, the concept of truthfulness isn't black or white, and there is a wide range of values between true and false. Thus, using "genuine information" and "altered information" is more appropriate. As rumours can be true and not, they can only be considered information in this classification. Another element is the intent to deceive. While hoaxes and Fake News aim to deceive and thus are part of deceptive news, poor journalism, satire, and parody don't. When dealing with satire and parody, the audience is aware of the goal: to mock with evident humour the actuality [15]. This humour is how satire and parody differ from misinformation: they don't present news seriously like the former category. Consequently, they're part of "inaccurate information" along with poor journalism, but they differ by the use of humour. While satires and parodies are inaccurate because they're based on humour, poor journalism is unintentionally inaccurate information. Finally, among "misleading content" hoaxes differs from disinformation by their intent. While disinformation aims to harm, hoaxes deceive for amusement. Using this classification, we propose that Fake News are part of disinformation by their diffusion of altered information with a will to harm.
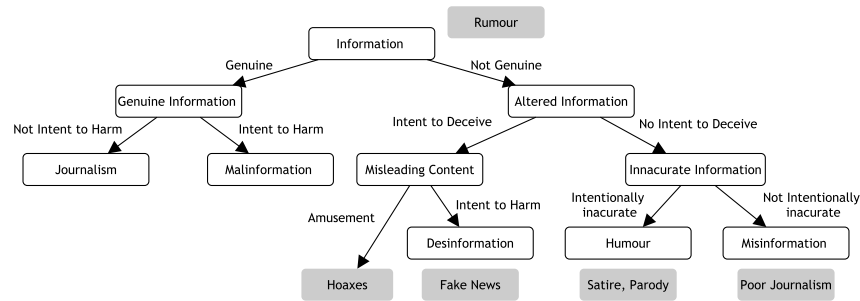


**Fig. 1.** Information Categorization: Fake News and some related concepts

## 4    Characterization of the Fake News Concept

From the literature, it follows that there is no consensus on the definition of Fake News. Nevertheless, common elements can be identified. One can sum them up by saying that Fake News is fabricated to manipulate certain people. However, in general none of the proposed definitions specifies who are the people who manufacture this false information, nor how Fake News manages to convince its targets that they are true, nor who these targets are. In the following, we precise the key notions embedded into the concept of Fake News and give our definition.

### 4.1   Fake News are not created for fun

65% of the false information about vaccination and Covid-19 came from just 12 people [2]. These are well-known figures in the American anti-vax sphere. They are conducting a coordinated campaign by fabricating Fake News about vaccines for Covid, which is part of a more extensive anti-vaccine campaign. This general pattern is typical and can be found in military operations (with a strategic level, an operational level and a tactical level). Here, the strategic level can be identified as an information war against vaccines, the operational level specifically targets vaccines against Covid and the different Fake News can be considered as a succession of tactical actions. Most Fake News fits into this three-tiered organization even if it is also possible to find isolated Fake News. Even if it is pretty easy to identify the creator of a Fake News, it is more challenging to identify people responsible for a disinformation campaign and information warfare. Nevertheless, they do exist. Thus, a conceptual model must allow to describe these protagonists.

### 4.2   Fake News create a distortion between real and false facts

Most of the time, a Fake News relies upon at least one *real fact*, as pointed out by [3], and consists of at least one *false fact*. For instance, in the Fake News targeting Hillary Clinton, the real fact was that Mrs Clinton fainted during a ceremony for the 9-11 victims in New York. According to her staff, her faintness is due to a pneumonia diagnosed some days ago. The false fact was she was diagnosed with brain cancer and had only six months left to live. As illustrated, a real fact occurs in a specific context. Knowing this context is essential to understand the real part of a Fake News.

A better understanding of Fake News implies being able to identify what are the real and false facts that constitute it. Several types of true facts can be identified. For instance, a fake news can be made from a political statement, from an occurred event or from real data such as picture or video. Similarly it can be possible to identify some false fact categories. Sometimes, it can be entirely invented and has no relation to any real fact. Other times it can only be a deformation of a real fact. It can be carried out by modifying figures, falsifying papers, and retouching photos. Finally the false fact is not clear and is just a deformation of a set of real facts. The latter is pernicious and relies on several Real Facts that have no concrete link between them. They are presented in such a way that they lead to a false conclusion.

### 4.3   Fake News Credibility: the authority notion

Most readers rarely check the authenticity of information presented by a newspaper. They rather take it for granted. Fake News generally use a different vector to be propagated (e.g. social networks), and the trust in those vectors can be lower. Thus, Fake News creators need to increase Fake News credibility. One way to do so consists in invoking an authority : few news readers check the authority

called upon in an article. It makes an interesting way for the creator to deceive the reader more easily and strengthen the credibility of the news. Thus, this authority notion must be incorporated in a conceptual model.

Three types of references to an authority were identified [1] : an intern authority, an external or a false one. In the first case, the source and the authority are two different entities. The authority is a renowned entity, referring to a person or an institute from whom the information released originates. By its renown and expertise, this authority provides credibility. When calling upon an external authority, the Fake News creator invokes well-known historical personalities whose words or actions are considered as a general truth. The goal is to draw a parallel between present and past by presenting the past as an unquestionable reference. This comparison reinforces the news due to the overall respect towards History. This calls upon historical figures, which generally have even more power than the first reference. Finally, the last one is the reference to a false authority, that can be either a real person with nothing to do with the fact at hand or a made-up person (a supposed expert in the area).

### 4.4   Fake News target a precise category of people and use a cognitive process based on emotions

Although a Fake News can influence different people in different ways, it is designed to reach a specific group of people to manipulate them in a particular way. It aims to influence the opinion of its target by generating an emotional charge. The target's reaction leads them to draw certain conclusions and change their mind about a topic. Identifying the purpose of a Fake News and who it is aimed at is therefore a challenge.

Overall, the goal of a Fake News is to make a person or a group of people change their mind about a subject. Thus, the Fake News goal is composed of three elements that would be clearly identified as part of a future conceptual model : the target, its opinion and the goal itself. The first two items are closely related since the target has an opinion on a subject. The last element embodies the influence the Fake News creator wants to have on the target. This can be either to weaken that particular opinion or to strengthen it. Thus, the goal of a Fake News can be represented by sentences according to the following scheme: "The goal of the Fake News is to" + goal + opinion + "among" + target. With the example of the Fake News regarding Hillary Clinton's health, the goal can be formulated as follows: "the goal of the Fake News is to weaken the belief that Hillary Clinton can lead the country among wavering American electors".

Behaviors and understanding of the world are both shaped by emotions, that drive or confuse people. As they emerge consciously or not, it doesn't seem easy to think and only act with reason when emotions are intense. This is why emotion loads generated in a Fake News must be considered. To be able to evaluate emotions in a future conceptual model, it is necessary to provide a clear range of values. A reasonably common characterization of emotions is given by the Plutchik wheel [11]. The latter clearly illustrates the relationship between the different emotions and their intensity.

After categorizing emotions, the conceptual model must capture the cognitive process involved in Fake News. [5] divided the mind's process into two distinct systems: (i) System 1 "is the brain's fast, automatic, intuitive approach". It is linked to the emotional and unconscious domains. Decisions are quick, impulsive, and sometimes irrational. (ii) System 2 is "the mind's slower, analytical mode, where reason dominates". It is slow and deals with the logical and conscious domain. With this two-system mind process, it is easy to understand why Fake News aim to generate emotions among readers. By doing so, they call upon the first system to overcome any attempt emerging from the second one. This emotional appeal prevents readers from awakening System 2 and forces them to think in an emotional state.

### 4.5   Our Fake News Definition

Based on the previous discussions, we setup the following definition of Fake News. The notions of "real" and "false" facts are at the heart of the Fake News concept and should then be considered. The emotional and cognitive process is also essential to understand the specific way the attacker influences the readers of the Fake News through its implicit conclusion. All that done having in mind to place it in a more general disinformation process. Thus, our definition is: *A Fake News is false but verifiable news composed of false facts based on real ones. Drafted in a way to trigger an emotional load, it aims to deceive its readers and influence their opinion through an implicit conclusion.*

## 5   Conclusions: Toward a Fake News Conceptual Model

In this article, we have shown how difficult is to clearly identify and position the concept of Fake News in the information ecosystem. Nevertheless, as the Covid pandemic and the war in Ukraine have shown, reliably classifying Fake News is an important challenge. To do so, we first classified the concept of Fake News in relation to other forms of information. Then, we identified important notions aiming at characterizing what is a Fake News, to highlight the key elements to be take into account. Our conviction is that these elements are the foundations that a conceptual model of fake news should take into account. The interest of such a model is to provide a clear characterization of what a fake news is. The applications of such a model are valuable. For example, in the challenge of identifying fake news, approaches using artificial intelligence (AI) are often proposed. But how these AI reach at these identifications is sometimes unclear. Using a conceptual model as a formal characterization model can be a solution to this problem. In this context, using a conceptual model can be seen as the first step of the XAI process proposed by [14], that it is crucial to make possible the full XAI-based process. The explainability with this approach is conceptually guided by the conceptual model which conforms the core of the contribution: to have an ontologically well-grounded definition of what a Fake News is, which is directly derived from the conceptual model. Thus, proposing a conceptual model Fake News to do so is naturally our future work.

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