Defining fake news for algorithmic deception detection purposes

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Abstract

One of the challenges of the digital age is the dissemination of false information on social media. False information on social media is causing problems. Technology-based solutions are being utilized to combat the fake news epidemic and deception detection algorithms are helping to identify false information. The aim of the thesis is to examine how those solutions define false information. Several of them use the ambiguous and overly misused ‘fake news’ to explain the situation. Our investigation shows that algorithmic deception detection papers define ‘fake news’, inadequately. Most of the algorithms are developed since 2017 and the rush to put the fire out might be the reason for the unsatisfactory problem definitions. Algorithms have a potential in combating fake news, but the lack of proper problem definition can lead to wrong, insufficient and erroneous results.

The 16 papers we investigate show that ambiguous and mixed meanings are used to define fake news. By utilizing thematic analysis, the thesis argues that fake news is an inadequate and improper term for academic purposes. Our analysis demonstrates that the false information dissemination phenomena need to be addressed and defined as disinformation.

**Keywords:** Fake news, Disinformation, Deception detection, Algorithm, Misinformation, Information disorder, Meaning,
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1 Introduction

The misuse of the term ‘fake news’ has created ambiguity and confusion. Since it is election year in Sweden we were originally planning to conduct a study about how fake news can affect the 2018 election. For that purpose, we came across a lot of information in relation to elections and the role of fake new in swaying votes. We read a lot of scholarly articles, journals and news reports and had an interview with the concerned Swedish agency. We realized that the term ‘fake news’ is not adequately defined and utilized to be used as representative term for the information disorder that we are in. There are a lot of efforts that ranges from fact checking, news flagging, crowd sourcing and algorithm deception detection up to fake website detectors to combat fake news and protect civil liberties as embodied in elections. The fake news epidemic might be one of the most talked about and inadequately defined one.

The interest of the thesis shifted from studying a country’s effort in combating fake news to examining the definitions and interpretations given to the term. Specifically, how algorithm-based deception detection research articles define the term is the main theme of the thesis. There are hundreds of scholarly articles with different definitions of the term. On top of that, some scholars argue against the use of ‘fake news’ since it lost all its academic meaning and purpose.

1.1 Background

fake news has become a household word since the 2016 USA election. Fake news has been named by Collins dictionary word of the year 2017. Usage of the term has increased with 365 percent from 2016 (collinsdictionary.com). A recent CNN count found that the 45th USA President Donald Trump on average used the term “fake news” more than once a day; 404 times between Jan 20,2017 and Jan 17, 2018 (Stelter, 2018). Even though the term gets a huge usage rate, it’s not a new phenomenon. A 1925 edition of the Harper Magazine published an article titled “Fake news and the public”. The article indicated the emergence of fake news (Lazar et al., 2017). Robert Darnton on his article “The true history of fake news”, has tried to shed light on the subject from historical perspective (Darnton, 2018).

An overview of fake news

Several researchers have been studying fake news since the controversial US 2016 election. Their papers focus on the sources of fake news, its social and political impact, and economic implications, and the type of measures needs to be taken to combat the fake news plague.

Fake news is produced and disseminated for different purposes’ ideological, monetary and for propaganda according to Allcott and Gentzkow, (2017). They argue that President Trump was favored by fake news disseminators. They also provide several bench marks that show voter manipulation. The 2016 Brexit referendum was also victim of fake news. According to news reports, intentional fake news dissemination by the Brexiters and others played a greater role for the exit decision (Grice, 2018). Marsden (2017) has a different view of fake news in relation to its use by some politicians; “fake news is the heartfelt cry of politicians who feel wronged by the online media”. He continues by saying that those politicians cry for help when they are barred from reaching their voters because of ad blocking and filter bubbles.
Gu et al., (2017) discuss fake news from a historical perspective. The paper focuses on how propagandists are abusing social media to influence politics, foreign affairs and commerce. Their framework ‘the fake news triangle’ incorporates social networks, tools and services, and the human motivation. Their study investigates the underground market places selling tools and services for public opinion manipulation campaigns.

The yearly report by the Reuters institute (Newman et al., 2017) focuses on fake news, changing business models and the role of platforms. The research is based on a YouGov survey, which encompasses 36 countries. The survey participants identified lack of rules and viral algorithms as motivating reasons for the spread of fake news.

Many businesses, public figures and celebrities are dependent on the attention they receive through social networks. A recent New York Times investigative article reveals the complexity of fake news and the market of tweets and likes (Confessore et al., 2018). A news report by NPR exposed one of the fake news fabricators. With his “fake news publishing empire” he admitted that he is making hefty profits by disseminating fake news on social media (Sydell, 2016).

The 2016 US election controversy sends a warning signal to other nations to safeguard their elections and democratic processes from foreign interference (the local). Fake news is multifaceted, it is serving as a propaganda machine (Gu et al., 2017), and it is being used to sway the values at stock markets (Ferrara et al., 2016).

**What is an algorithm?**

Since we are going to mention algorithm several times in the thesis, it is useful to define the term. Cormen et al., (2009) define algorithm as a computational procedure based on an input output relationship. They also define it as a tool that can be utilized for solving a well-specified computational problem. Algorithms take large data sets and produce correlations, interpretations, recommendations and even decisions. Smith (2018) describe the early algorithms as logic of classical computing. The algorithms were simple, and they are intended to perform small tasks. Smith (2018) argues that the advent of internet and search engines in mid-1990’s changed the behavior and application of algorithms. Currently, complex algorithms are implemented in health care, stock market, military, education system and in many more.

**1.2 Research problem**

Fake news has become a buzzword (Tandoc et al., 2018). Despite the common use of the term, it eludes common definition (Wardle, 2017). The term is defined and categorized the way it suits the purpose of the user. Lack of agreed understanding and interpretations leads the term to have conflicting definitions (Persily, 2017). Fake news is an ambiguous and misleading word (Publications.europa.eu., 2018). Because of the misuse and abuse of the term some scholars are arguing that fake news has shifted away from academic understanding (Haiden et al., 2018).
1.3 Research question

Fake news, as ambiguous as it is, it has several overlapping often mixed meanings and interpretations. It can mean false news, misinformation, disinformation, propaganda, hoax and satire. Others put those definitions as categories of fake news. The thesis is focuses in answering the following questions;

1. How well do algorithms define fake news?
2. What can be done to improve the definitions of fake news in algorithms that are meant to detect fake news?

1.4 Aim of the study

Combating fake news requires a coordinated effort and algorithmic deception detection is part of the effort. Machine learning based solutions got huge attention and soon became a discussion point. One of the major discussions among scholars is how can algorithms understand the context, intent and the hidden words in context. This thesis focuses on how deception detection algorithms define and understand false information.

1.5 Limitation

Fake news is multilayered. The research will only focus on how fake news is defined by algorithmic deception detection researches. This study will not investigate how algorithms behave and function or what methods they implement for fake news detection.
2 What is Fake News?

While the complexity, ambiguity and lack of common definition still surrounds fake news, there are technological efforts to combat the dissemination of fake news. Several algorithmic solutions are developed and proposed to solve the problem. Even if one can use the most powerful and shiniest algorithms and fail to define the problem, as Brownlee (2018) puts it “the results will be meaningless; algorithms with the wrong definition of fake news will ‘solve’ the wrong problem”. The aim of chapter two is to show how definitions and meanings matter in relation to developing algorithms for fake news detection purposes.

2.1 Fake News- to use it or not

There is an on-going debate among scholars on the significance of using the term “fake news” representing “information disorder” (Wardle, and Derakhshan, 2018). Those who oppose the use of the term cite the term’s ambiguity and its conflicting definitions as a problem. An EU high level group on its report on disinformation states that disinformation is the problem not fake news (Publications.europa.eu. 2018). The group presents two main reasons for its decision to refrain from using the term “fake news”;

(1) “Firstly, the term is inadequate to capture the complex problem of disinformation, which involves content that is not actually or completely “fake” but fabricated information blended with facts, and practices that go well beyond anything resembling “news” to include some forms of automated accounts used for astroturfing, networks of fake followers, fabricated or manipulated videos, targeted advertising, organized trolling, visual memes, and much more.

(2) Secondly, the term ‘fake news’ is not only inadequate, but also misleading, because it has been appropriated by some politicians and their supporters, who use the term to dismiss coverage that they find disagreeable and has thus become a weapon with which powerful actors can interfere in circulation of information and attack and undermine independent news media.” (Publications.europa.eu. 2018).

Wardle and Derakhshan (2018), gave similar reasons as the EU expert group for their avoidance of the term fake news on their report “Information Disorder”. Their first reason is, fake news is insufficient to describe the complex phenomena of information pollution. Secondly, fake news is being used and abused by politicians to attack news organizations and undermine press freedom. They argue that fake news lost its academic meaning and understanding.

An 11 years, large-scale study on twitter (Vosoughi et al., 2018) also refrains from using fake news. The authors believed that fake news is abused and misused by politicians beyond repair. As a reason of that it is missing its understanding for academic purposes. Instead they preferred to use “true” and “false” news.

Even though they share the same concern, other scholars (Lazer et al., 2018) state three reasons for using the term “fake news” on their articles.

First, it has a useful scientific meaning (the intersection of misinformation and mimicry of traditional news media). Second, it is very prominent recent misuse has a salutary side effect of focusing attention on the more general problem of misinformation. Third, while the term “false
news” avoids the weaponization problem in the near-term, should the effort to shift the popular and scholarly nomenclature toward “false news” succeed, it would likely be subject to the same sort of weaponization that we have seen with “fake news” (Lazer et al., 2018).

2.2 Fake news, post-truth and Gaudy Facts

Fake news has created an on-going debate on another front in relation to its representation of the situations created by misinformation and disinformation. Like fake news, post-truth also declared word of the year by Oxford Dictionary (Flood, 2016).

McManus and Michaud, in their article “Never mind the buzzwords: defining fake news and post-truth”, which is included on the “Fake news: A Road Map” (Haiden et al., 2018), define post-truth by explaining what the prefix post means in linguistic terms. “Post suggests that the specified concept has become unimportant or irrelevant. Post-truth would therefore imply that truth is no longer relevant, and more importantly suggest that it was preceded at some point in time by an era of truth” (Haiden et al., 2018). Post-truth politics on the other hand is defined as “where emotions are dominant the factual rebuttals or facts checks are ignored on the basis that they are mere assertions” (Suiter 2016). The Oxford Dictionary defined post-truth as “relating to or denoting circumstances in which objective facts are less influential in shaping political debate or public opinion than appeals to emotion and personal belief” (Oxford Dictionaries 2018b).

Haiden (2018) argues that if post-truth examined in the context of populism, the meaning might be slightly different. She stresses that “while truth is still important, instead of scientific research, personal experiences and emotions are favored as the guiding principles for making the right judgements and seeking truth”.

Lewandowsky et al., (2017) state that ‘fake news’ and ‘post-truth’ are unknown to the public before 2016, the year of the controversial US election. According to them “societal megatrends” are the main reasons for the wider use and recognition of those two terms. The societal megatrends encompass “a decline in societal capital, growing economic inequality, increased polarization, declining trust in science, and an increasingly fractionalized media landscape”. Haiden (2018) has a similar view of post truth. She sees the year as the start of the era of post-truth. “The year we allegedly left the world of rational argument and objective facts and entered a world of ‘bullshit’ and lies”.

Some scholars argue that the situations that are happening since 2016 should only be expressed as post-truth and they discard fake news as insufficient to express the events. Rochin (2017), discusses the misunderstanding of fake news and what it represents. “There is a misunderstanding of what fake news can be contested in an intellectual spectrum of true-untrue in an era of post-truth and mass social divide, this is no longer viable”. Rochin also argues that fake news does not mean fact less or no more malicious news. The reason is that fake news is being utilized to attack a person’s pre-existing belief. He explains this sad demotion of the term as “the truth of the post-truth era”.

Rochin (2017) further explains why the term fake news should not be taken seriously in academia. He believes that “fake news has become almost a joke; a tongue in cheek reference’ used by society to refer to any news it doesn’t agree with”. He also makes a distinction between fake news and true “fake news”. He defined the real fake news as “a knowingly false headline and story written and published on a website that is designed to look like a real news site and is spread via social media” and fake news is “Any story that goes against one’s personal beliefs or feeling’s” (Rochin 2017).
There is also a strong opposition against the use of post-truth. The computer science professor Hal Berghel (2017) strongly opposes the use of post-truth for representing the “the 2016 mood”. Berghel dismisses post-truth and introduce his own term “gaudy facts”. He believes that his term will emphasize the garish and tawdry nature of the recent political dialogue. He explains “gaudy facts have the advantage of avoiding the word truth altogether since there’s precious little of that in political discourse”.

2.3 Scholarly definitions of fake news, disinformation, misinformation, propaganda and hoax

Several scholarly articles use the terms fake news, misinformation and disinformation interchangeably. There is a growing concern about the lack of clear distinction between fake news, ideologically slanted news, disinformation, misinformation and propaganda (Newman et al., 2017). Those terms have similarities and differences in their definitions. In this section some of the definitions will be discussed.

The threats of fake news are worrying many including religious leaders. Pope Francis labeled fake news as evil by stating the practice as old as humans. In his annual social communications message, the pope explains fake news dissemination tactics as “Snake tactics” by refereeing the “Crafty serpent” from the book of Genesis. According to the pope’s message the first fake news was created “the tragic history of sin” (Francis, 2018).

Pope Francis used similar terminologies used by different scholars to define fake news and why and how it spread like uncontrollable wildfire.

“False information based on non-existent or distorted data meant to deceive and manipulate the reader” (Francis, 2018).

2.3.1 Defining fake news

Before entering the debate how algorithms define fake news, we have to get a better glimpse of how fake news and its cousins are defined by academia. Fake news is recognized as the most ambiguous and misused word. The definitions, explanations and understanding of what the term represents depends on the purpose and aim of the definer. For this study, we tried to collect definitions, categorizations and classifications of fake news from scholarly articles. The purpose of conducting a review of fake news definitions is to indicate the need of an agreed upon meaning so that scholars, students and media professionals have a common understanding. Mainly it helps those who are trying to combat fake news.

- Fake news, “News articles that are intentionally and verifiably false and could mislead readers” (Allcott and Gentzkow 2017).

- “Fake news is a provocative headline that is shared and believed at face value, with no thoughtful investigation” (Rochin 2017).

- Fake news represents information of various stripes that is presented as real but is patently false, fabricated, or exaggerated to the point where it no longer corresponds to reality; what is more, this
information operates in the express interests of deceiving or misleading a targeted or imagined audience (Reilly, 2018).

- “Fake news is the promotion and propagation of news articles via social media. These articles are promoted in such a way that they appear to be spread by other users, as opposed to being paid-for advertising. The news stories distributed are designed to influence or manipulate users’ opinions on a certain topic towards certain objectives” (Gu et al., 2017).

- “Fake news defined as misinformation that has the trappings of traditional news media with presumed associated editorial processes” (Lazar et al., 2017).

- Fake news refers to “lies represented as news that is, falsehoods online formatted and circulated in such a way that a reader might mistake them for legitimate news articles” (Mustafariaj and Metaxas, 2017).

- “Fake news, or hoax news, refers to intentionally false information or propaganda published under the disguise of being authentic” (Svärd and Rumman, 2017).

- “The dissemination of false information via media channels (print, broadcast, online). This can be deliberate (disinformation) but can also be the result of an honest mistake or negligence (misinformation)” (Haiden et al., 2018).

- “Fabricated information that mimics news media content in form but not in organizational process or intent” (Lazer et al., 2018).

- “Misleading news stories that come from non-reputable sources” (Gilda 2017).

- “Fake news is a recent popular and purposefully ambiguous term for false news stories that are packaged and published as if they were genuine. The ambiguity of this term—an inherent property of what it tries to label—makes its use attractive across the political spectrum, where any information that conflicts with an ideology can be labeled ‘fake’” (DiFranzo and Gloria, 2017).

Based on the above 11 definitions we can conclude that fake news definitions are many and varied. False news, misleading, fabricated, exaggeration, misinformation, online falsehood, intentional false information, hoax and propaganda are some of the terms used to define fake news. Those terms are ambiguous and mixed. The inclusion of misinformation for defining fake news can be taken as an example to illustrate the confusion. Unlike fake news, misinformation represents mistakes or errors that happen as a result of negligence. It does not have the intent to mislead or do harm.

2.3.2 Typology of Fake News

With all the complexity encircling the term fake news, some scholars focus on defining it while others prioritize to classify fake news based on its use and its relationship with other information categories.
Wardle (2017) presents a typology of fake news which has seven categories:

Newman et al., (2017) conducted a survey for the Reuters digital news report (2017) in 36 countries. The researchers were looking how fake news was understood and interpreted by different countries and cultures. The result shows that the survey respondents failed at categorizing the three kinds of fake news separately and got them mixed up. The following categories are identified by the researchers.

(1) news that is ‘invented’ to make money or discredit others;
(2) news that has a basis in fact, but is ‘spun’ to suit a particular agenda; and
(3) news that people don’t feel comfortable about or don’t agree with

A large-scale study by Tandoc et al. (2018), reviewed 34 scholarly articles which used the term “fake news” between 2003-2017. They distinguished two dimensions: facticity and deception. Facticity was defined as the degree to which fake news relies on facts. Deception was seen as the degree to which the creator of fake news intends to mislead. Using these two dimensions the study resulted in “a typology of types of fake news”. Six identified types of fake news:

(1) **News satire**- Referring to mock news programs, which typically use humor or exaggeration to present audiences with news updates. These programs are typically focused on current affairs and often use the style of a television news broadcast (a “talking head” behind a desk, with illustrative graphics and video), much as a regular news program.

(2) **News parody**- Parody is a second format which previous studies have referred to as fake news. It shares many characteristics with satire as both rely on humor as a means of drawing an audience. It also uses a presentation format which mimics mainstream news media. Where parodies differ from satires is their use of non-factual information to inject humor. Instead of providing direct commentary on current affairs through humor, parody plays on the ludicrousness of issues and highlights them by making up entirely fictitious news stories.

(3) **Fabrication**- refers to articles which have no factual basis but are published in the style of news articles to create legitimacy. Unlike parody, there is no implicit understanding between the author and the
reader that the item is false. Indeed, the intention is often quite the opposite. The producer of the item often has the intention of misinforming.

(4) **Photo Manipulation** - the manipulation of real images or videos to create a false narrative. Where the previous categories generally refer to text-based items, this category describes visual news. Manipulation of images has become an increasingly common occurrence with the advent of digital photos, powerful image manipulation software, and knowledge of techniques. Effects may range from simple to complex. Simple adjustments can include increasing color saturation and removing minor elements. More-invasive changes can include removing or inserting a person into an image.

(5) **Advertising and Public Relations** - Advertising materials in the guise of genuine news reports as well as to refer to press releases published as news. Based on this definition video news releases are termed as fake news. VNRs are pre-packaged video segments produced by public relations firms aimed at selling or promoting a product, a company, or an idea.

(6) **Propaganda** - Refers to news stories which are created by a political entity to influence public perceptions. The overt purpose is to benefit a public figure, organization or government. (Tandoc et al., 2017).

### 2.3.3 Disinformation

Since the era of the cold war, the term disinformation has been a discussion point both in the media and academia. Martin (1982), claims that disinformation is derived from the Soviet word ‘Dezinformatsiya’ which is described as the dissemination of false and provocative information. “The Soviet Union secret service used it as a persuasive technique that’s based on forgeries and staged events”. He classified forgery and fabrication as parts of disinformation.

Bittman (1990), argues that the term disinformation has its roots from German and adopted by the former Soviets to deceive their ideological opponents. Both Martin and Bittman classify disinformation as a form of propaganda.

- “False, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or for profit” Publications.europa.eu. (2018).
- “Disinformation refers to the deliberate creation and sharing of information known to be false” (Wardle, 2017).
- “Is a form of propaganda in which either the focus is based on some unlawful act or the message is a misrepresentation of a lawful act or true situation. The intent of disinformation is to persuade by whatever means possible or available” (Martin, 1982).
“Disinformation is twisted. Secretly inserted into an opponent’s communication system, its intention is to deceive either the public in which case its propagandistic disinformation or the decision-making elite” (Bittman, 1990).

“Disinformation is intentionally false or inaccurate information that is spread deliberately” (Kragh and Åsberg, 2017).

“Disinformation is nothing new, of course. Forged documents, doctored photographs, deceptive advertising, deliberately falsified maps, and government propaganda” (Fallis, 2009).

Dis-information- “Information that is false and deliberately created to harm a person, social group, organization or country” (Wardle and Derakhshan, 2018).

The reviewed seven definitions and related terms are used to define disinformation. False, inaccurate, misleading, deliberate creation, a form of propaganda, forgery, and deliberately created have more or less an identical meaning. The definitions seem to follow the intent behind disinformation causing public harm, gaining financial benefit, to persuade, to deceive and to cause harm to the public and country are stated as intents to disinform.

2.3.4 Misinformation

Several academic articles define misinformation as an error, honest mistake and inaccurate information. It doesn’t have the intent to deceive but it is misleading. (Fallis, 2015). Wardle and Derakhshan (2018), categorized three types of information disorder. In addition to disinformation and misinformation they include mal-information, it is defined as “Information that is based on reality, used to inflict harm on a person, organization or country” (Wardle and Derakhshan, 2018, p.21).

- “Is wrong or false information circulated as a result of a genuine mistake, omission, prejudice or sheer ignorance” (Bittman 1990).

- “Misinformation is unintentional dissemination of false information” (Kragh and Åsberg, 2017).

- “Misinformation refers to the inadvertent sharing of false information” (Wardle, 2017).

- “Misinformation is inaccurate information that is the result of an honest mistake or of negligence” (Haiden et al., 2018).

- “Misleading or inaccurate information shared by people who do not recognize it as such” Publications.europa.eu. (2018).

The above five have a coherent definition of misinformation. It seems that the academia has a common and less ambiguous understanding of the definitions. Several papers and articles defined misinformation in the same fashion and we exclude them to avoid repetition.
2.3.5 Propaganda

Bittman (1990), and Martin (1982), explain that disinformation is a crucial component of propaganda. The commonality between fake news, disinformation and propaganda is the fabrication of and the intent to deceive. Martin also states that propaganda is a failed attempt of fabrication and falsification for the purpose of persuasion and deception.

- “Propaganda is something that is conducted by one's opponents, and it must be unsuccessful to be called propaganda” (Martin, 1982).

2.3.6 Hoax

Hoax has some similarities with disinformation. The intent is to deceive by the deliberate fabrication of a falsehood. The Oxford Dictionary defines hoax as a humorous or malicious deception, and trick or deceive someone. Wikipedia states several assumptions and perceptions of hoax. As propaganda, hoax also used from individuals to governments to deceive public opinion. A hoax is often intended as a practical joke or to cause embarrassment, or to provoke social or political change by raising people's awareness of something (Wikipedia).

- “To trick into believing or accepting as genuine something false and often preposterous” (Merriam-webster.com).

- Hoaxing as “a humorous or mischievous deception, usually taking the form of a fabrication of something fictitious or erroneous.” (Concise Oxford dictionary).

- “A hoax is a falsehood deliberately fabricated to masquerade as the truth” (Wikipedia.com).

The above listed definitions show that defining information disorders is not an easy task. Fake news has the most diverse definitions. The intent to deceive and to cause harm can be taken as the distinguishing factor that disinformation, propaganda, and hoax share. We will use those definitions as a stepping stone for examining the definitions given by algorithmic deception detection solutions.
3 Theory

The thesis focuses on the definitions of fake news, disinformation and misinformation for algorithmic detection purposes. How words, terms and sentences are being defined has a big impact on the detection process. In this part of the study we discuss the theory of meaning, especially semantics and pragmatics meaning, and briefly the concept of deception detection.

3.1 Meaning

Words, terms, utterances, and sentences can have several meanings based on the context and the intent of the speaker. Words can be used to mean something else than the word reads and sounds. Words have meanings that have ‘implicature’ (Grice 1967). If the words are expressed with identifiers like “means”, “means something”, “means that”, we can say the word retains its first or natural sense (Grice 1957). This can be termed as the natural sense or simply sense. Grice termed the second sense of the word as non-natural sense. He denotes this unnatural sense as “means $NN$”.

Other scholars (Larson and Segal 1995; Thomas 1994, 2014; Hofmann 2015) have examined the ambiguity created by contextual meanings using the theories of semantics and pragmatics. Semantics represents the envisioned meaning of the word. The thesis will focus on semantics to show the difficulty of defining some terms like fake news for classifying and categorizing false and misleading news stories. First, semantics will be discussed for situating pragmatics. Pragmatics will be discussed thereafter.

3.1.1 Semantics

Semantics is the study of linguistic meaning. The aim is to provide theoretical descriptions and explanations of the phenomena of linguistic meaning. Larson and Segal (1995, p.2) identified actual meaning, ambiguity and anomaly as semantic properties.

Actual meaning is the intended meaning of a word without any context attached. Larson and Segal (1995 p.2), explained actual meaning with an example; “Camels have humps means Camels have humps”. Actual meanings should be taken literally.

Ambiguity can arise from one or more components of a sentence. They presented at least three types of ambiguity;

(a) Ambiguity that arises from one of the component words.

(b) Ambiguity arises not from the words of the clause but rather from our understanding of those words in combination.

(c) Ambiguity involves the combination of (a) and (b).

The third semantics property is anomaly. It arises when the property has an aberrant meaning. The authors borrowed Chomsky’s (1957) “colorless green ideas sleep furiously” to explain the property. The quoted sentence can be identified as an odd sentence with some absurdity. Unusual but syntactically correct sentences are termed as parts of semantics.

According to Larson and Segal, the process of using knowledge of language in understanding perceived sentences involves three processes of understanding.
Parsing - is understanding the sentences in one’s language phonologically. Syntactic arrangement must be identified, and one must know the meaning of the words and how they compose. The concept seems clear and easy, but it should be done sequentially in order of phonological (systematic organization of sounds in a language), syntax and then semantics. Parsing only concerns the application of linguistic knowledge. Linguistic knowledge only provides us with context-independent meaning of an utterance.

Language understanding - contains context-dependent features of utterance meaning. Relevant features of context must be identified and combined with knowledge of language in (1).

Pragmatics - knowledge of language only provide us with literal meanings of sentences. There is always a gap between what is being said with a sentence and what the speaker intends to convey. Pragmatics can bridge this gap.

3.1.2 Pragmatics

Pragmatics is the study of meaning that deals with words or sentences with more than one meaning. Hofmann (2015) elaborates the role of pragmatics in understanding the intent of words with the following example.

“Whenever language is used, there is a speaker and his intent, and more often than not, the ultimate intent is hidden behind the literal meaning (i.e. 'between the lines') of what is said. A teacher might say to a twenty-minute-late student, 'My, you're early today!' Does she mean that? What does she mean?’” (Hofmann 2015, p.273).

Hofmann states that pragmatics appears in everyday life. “in non-literal use of sentences, the idea conveyed is not the same as the meanings of the word. Exaggeration is one very common type, as are metaphor, sarcasm and irony” (Hofmann, 2015). He also mentions politeness as a reason why people avoid speaking directly. Thomas (2014) also mentions politeness as a reason for indirectness. Politeness theory is seen as a sub-discipline of pragmatics. Politeness doesn’t imply the speaker’s behavior. It deals with what the speaker says and how the hearer reacts (Thomas 2014, p.150). Conversational maxims are one of the theories proposed to understand the non-literal use of the word. The theory is developed to secure understanding between the speaker and the listener. The two parties must have some level of understanding and one must ‘choose one’s words’ so that the other can understand the intent and the hearer must try to figure out what the speaker meant. Hofmann proposes six of such maxims;

Maxims of quantity

(1) Give as much information as is needed.

(2) Give no more information than is needed.

Maxims of quality

(3) Do not say what you believe to be false.

(4) Do not say what you have no evidence for.

Other maxims
(5) Be relevant.
(6) Be perspicuous:
   (a) do not use obscure expressions.
   (b) do not use ambiguous expressions unless necessary.
   (c) be brief.
   (d) be orderly (Hofmann 2015 p.275).

The most common definition of pragmatics is meaning in use or meaning in context. Thomas (2014) introduces pragmatics with the following example;

“Our might say: “It’s hot in here!” But what I mean is: “Please open the window!” or “Is it all right if I open the window?” or “You’re wasting electricity!” People can mean something quite different from what their words say, or even just the opposite” (Thomas, 2014 p.1)

Thomas prefers to define pragmatics by compartmentalizing it into levels of meaning, abstract meaning, contextual meaning and force.

Abstract meaning - is concerned with what a word, phrase, sentence, etc. could mean. A dictionary meaning of words or phrases can be a good example.

Contextual meaning (utterance meaning or 1st level of speaker meaning) - is the transition we as a hearer make when we understand what the speaker means by those words on that particular occasion. In the above example, when the speaker utters the words “It’s hot in here!” the abstract meaning is that the room is obviously hot. When the hearer/listener acts after understanding the intent of the words, it can be said that he/she arrived at the contextual meaning (Thomas, 2014).

Force - refers to the speaker’s communicative intentions. Thomas describes force as the second level of speaker meaning. Force deals with finding the real intention behind the word, utterance or question. Thomas explains force with the question “Is it your car?” Here we can’t find any ambiguity or hidden meaning. It is a clean and simple question. In this regard the question passes both abstract and contextual phases easily. Here the point of concern is ‘the force of the question’ (Thomas 2014). Why did he ask? Is he appreciating or expressing scorn? Is he commenting how the driver parked his car? Is he asking for a ride? This and other ‘pragmatics forces’ (Thomas 2014) can be drawn from a simple question or a sentence when a listener tries to understand the meaning.

Pragmatics and indirectness

Indirectness is the major manifestation of pragmatics. Thomas raises four points we must consider when we discuss pragmatic indirectness.

- We shall be concerned with intentional indirectness.
- Indirectness is costly and risky.
- We assume (unless we have evidence to the contrary) that the speakers are behaving in a rational manner and, given the universality of indirectness, that they obtain some social or communicative advantage through employing indirectness.
- In discussions we might tend to ignore some terms or ideas as difficult to express and we prefer to avoid them. Thomas (2014) argues that for the purposes of any particular argument, we shall ignore the possibility that X cannot be expressed.
3.2 Deception Detection

Deception is often used interchangeably with lie. It is defined as intentionally, knowingly, and/or purposely misleading another person (Levine, 2014). Buller and Burgoon (1994), define deception as messages and information knowingly transmitted to create a false conclusion. Levine (2014) argues that deception does not require ‘conscious forethought’. But he also admits that some deception needs planning. Deceptive messages involve intent, awareness, and/or purpose to mislead (Levine, 2014). He argues that deception is probable when the truth is difficult to bear or when it becomes inefficient for the intended purpose of the deceiver. Based on the above definitions and descriptions we can assume that deception detection is a question of pragmatics. Sille, (2018) expresses his concern on the efficiency of algorithms to detect information disorders without realizing the pragmatic meaning of the word, utterance and term.

Zhou et al., (2004), proposed an automated linguistics-based cues (LBC) methods for deception detection. The automatic deception detection could be based on machine learning techniques. Their theory involves training a machine learning algorithm with previously classified messages in each context. After the algorithms had been successfully trained the resulting cues or indicators could be used to create a set of profiles for deceptive messages in that context. The values of indicators could be fed as features to an algorithm that learns to combine evidence to generate high-confidence warnings of deception (Zhou et al., 2004). The researchers are confident that any algorithm trained by their method will have the ability to adjust to different strategies of deception appearing in different contexts.

Zhou et al. (2004) concluded that based on their findings, automated LBC is achievable. But they have doubts that the same cue profiles are unlikely to apply uniformly across contexts.

3.3 Related Work

Fake news dissemination on social media got a wider attention in the academic world since the 2016 US election. Several researches are conducted to indicate ways to combat fake news. Researchers are developing theories, theoretical frame works, algorithmic and other information systems and computer science-based solutions. we tried searching for scholarly articles on the concern we raised, and we only found two articles on the specific area.


With the outset of automatic detection of information, misinformation, and disinformation, Sille’s paper has the purpose of examining and discussing various conceptions of information, misinformation, and disinformation within philosophy of information. The examinations are conducted within a Gricean framework to account for the communicative aspects of information, misinformation, and disinformation as well as the detection enterprise.

While there often is an exclusive focus on truth and falsity as that which distinguish information from misinformation and disinformation, the paper finds that the distinguishing features are intention/intentionality and non-misleadingness/misleadingness with non-misleadingness/misleadingness,
as the primary feature. Further, the paper rehearses the argument in favor of a true variety of disinformation and extends this argument to include true misinformation.

Sille stresses that to determine whether a news is misinformation or disinformation it requires evaluative judgements of content, context, purpose etc. and whether such judgments can be automated. One of his main questions is what algorithms should look for to detect misinformation and disinformation. He investigated four algorithmic detection solutions and studied how they defined misinformation and disinformation for detection purposes. The conceptual paper explores and analyzes the very nature of information, misinformation and disinformation and their interactions. Sille proposes a more detailed study is required for better understanding of those notions. He argues that algorithmic detection solutions should detect the distinguishing features of those notions.

Haiden and Althuis (2018) paper “The definitional challenges of fake news” focuses on investigating how fake news and disinformation defined and how it impacted research on the field. The authors reviewed most cited papers published since 2016. They evaluated the definitions they gather against the definitions published on a scholarly paper titled, “Fake News: A Road Map” (2018). They didn’t state their reason for specifically selecting the paper for evaluation purposes except its being a comprehensive study. The authors main aim is to bridge the gap on defining fake news, disinformation and misinformation between policy makers and the research community. The paper finds that policy makers are more focused on the definitions of disinformation while neglecting misinformation. The paper acknowledges the efforts done by algorithms, but it didn’t discuss how fake news and disinformation are defined for algorithmic detection.
4 Methodology

4.1 Research Strategy

The study aimed at the meaning, understanding and interpretation of fake news, misinformation, disinformation and hoax focusing on algorithm-based deception detection scientific papers. The study has at least two ‘hypotheses’ to prove;

A) Fake news is badly or inadequately defined.
B) Deception detection algorithms define fake news insufficiently.

The thesis follows qualitative approach for data collection and thematic analysis to analyze the data. Since fake news is not clearly and acceptably defined, exploratory approach chosen to generate qualitative information and interpretation. Meyers (1997), defines qualitative research as a method that involves the use of qualitative data, such as interviews, documents, and participant observation data to understand and explain social phenomena. The thesis is an exploratory study with the aim of understanding the fake news phenomena through the meanings and interpretation provided by researchers. “Exploratory research is intended to provide conclusive, but it helps to get a better understanding of the problem” Research-Methodology (2018).

4.1.1 Mapping Definitions

The results of the 2016 US election and the Brexit referendum sent a warning signal to other nations that no country is safe if the superpowers fail for it. Political scientists, journalists, information professionals, educators and the tech community were working separately and seldom in coordination to combat fake news. We searched most of the peer-reviewed scholarly articles published on journals, conferences and on library databases. We mapped the selected articles in tabular format. The categories we identified are; Title, Authors, publisher, year of publication, method of detection, artifact/model/framework, and definition of fake news. The mapping exercise showed that the definitions and interpretations presented by those articles are not in unison, there is no agreed upon definition of fake news.

Some of the definitions (discussed on section 2.3) are presented to show how fake news, misinformation, disinformation, hoax and propaganda are defined differently. Fake news detection is a new field of study with limited articles on the subject. Most of the algorithmic solutions are based on machine learning principles.

Structure of the mapping

The algorithmic deception detection research articles are searched mostly on Google Scholar. Other scientific journals, conferences and university library online data bases are also searched. The main criteria to pass an article as valid was based on; 1) The article need to be algorithmic deception detection solution. 2) The article should define at least one information disorder. 3) Peer reviewed, if applicable.

The following terms are used separately and in conjunction with other listed terms.

- “fake news”
Most of those key words yield the desired deception detection algorithmic articles. “deception detection”, and “algorithmic deception detection” produced mixed results from other branches of detection. “fake news”, “misinformation” and “disinformation” delivered very few articles. The rest of the key words repeatedly shown similar results. 27 articles were collected from:

- IEEE publications,
- Arxiv.org,
- willy.com,
- ACM digital library,
- research gate
- EMNLP workshop,
- ACL web,
- Semantic scholar,
- and others.

Based on the selection criteria, 16 articles were selected. We only selected those that are defined at least one of the information disorders. Out of the 27 articles 4 of them failed to define what they are proposing to detect. As a consequence, they were excluded from the study. Five articles were omitted because they did not deal with technical algorithmic solutions; some of them are frameworks or a study about detection methods.

This is the list of 16 scholarly articles selected. Only the basic information of the publications is stated in the table. The definitions will be discussed in the results section in Chapter 5.

<table>
<thead>
<tr>
<th>Id</th>
<th>Year</th>
<th>Publication details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2015</td>
<td><strong>Title:</strong> Automatic Deception detection: Methods for finding fake news  &lt;br&gt; <strong>Author(s):</strong> Niall J. Conroy, Victoria L. Rubin, and Yimin Chen  &lt;br&gt; <strong>Summary:</strong> The research surveyed the technologies developed for the purpose of deception detection. It researched different veracity assessment method developing from linguistics cue approaches with machine learning and network analysis approaches. As a result, they proposed operational guidelines for a feasible fake news detecting system.  &lt;br&gt; <strong>Keywords:</strong> Deception detection, fake news detection, veracity assessment, news verification, methods, automation, SVM, knowledge networks, predictive modelling, fraud</td>
</tr>
<tr>
<td>2</td>
<td>2015</td>
<td><strong>Title:</strong> Deception detection for news: Three types of fakes</td>
</tr>
<tr>
<td>Year</td>
<td>Title</td>
<td>Author(s)</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2017</td>
<td>Some like it hoax: Automatic fake news detection on social networks</td>
<td>Eugenio Tacchini, Gabriele Ballarin, Marco L. Della Vedova, Stefano Moret, and Luca de Alfaro</td>
</tr>
<tr>
<td>2017</td>
<td>CSI: Hybrid deep model for fake news detection</td>
<td>Natali Ruchansky, Sungyong Seo, Yan Liu</td>
</tr>
<tr>
<td>2017</td>
<td>Fake news detection on social media</td>
<td>Kai Shu, Amy Sliva, Suhang Wang, Jiliang Tang, and Huan Liu</td>
</tr>
<tr>
<td>2018</td>
<td>Detecting opinion spams &amp; Fake News using text classification</td>
<td>Hadeer Ahmed, Issa Traore, and Sherif Saad</td>
</tr>
<tr>
<td>2015</td>
<td>Towards news verification: deception detection methods for news discourse</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Title</td>
<td>Author(s)</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-----------</td>
</tr>
<tr>
<td>2016</td>
<td>Hoaxy: A traction for tracking online misinformation</td>
<td>Victoria Rubin and Yimin Chen</td>
</tr>
<tr>
<td>2017</td>
<td>Automatic detection of fake news</td>
<td>Chengcheng Shao, Giovanni Luca Ciampaglia, Alessandro Flammini, and Filippo Menczer</td>
</tr>
<tr>
<td>2016</td>
<td>Hoaxy: A traction for tracking online misinformation</td>
<td>Veronica Perez-Rosas, Bennett Kleinberg, Alexandra Lefevre, and Rada Mihalcea</td>
</tr>
<tr>
<td>2017</td>
<td>Fake news detection in social network via crowd signals</td>
<td>Sebastian Tschiatschek, Adish Singla, Manuel Gomez Rodriguez, Arpit Merchant, and Andreas Krause</td>
</tr>
<tr>
<td>2017</td>
<td>Fake News Detection using Stacked Ensemble of Classifiers</td>
<td>James Thorne, Mingjie Chen, Giorgos Myrianthous, Jiashu Pu, Xiaoxuan Wang, and Andreas Vlachos</td>
</tr>
<tr>
<td>2017</td>
<td>Stance Detection for the Fake News Challenge with Attention and Conditional Encoding</td>
<td>Stephen Pfohl, Oskar Triebe, and Ferdinand Legros</td>
</tr>
<tr>
<td>2018</td>
<td>We Built a Fake News &amp; Click-bait Filter: What Happened Next Will Blow Your Mind!</td>
<td>Georgi Karadzhov, Pepa Gencheva, Preslav Nakov, and Ivan Koychev</td>
</tr>
</tbody>
</table>
Table 1 publication details

| 14 2016 | **Title**: Disinformation on the web: Impact, Characteristics, and Detection of Wikipedia Hoaxes  
**Author(s)**: Srijan Kumar, Robert West, Jure Leskovec  
**Summary**: the researchers study an automated classifier of hoaxes for the purpose of detection on Wikipedia.  
**Keywords**: |
|---|---|---|---|
| 15 2018 | **Title**: Studying Fake News via Network Analysis: Detection and Mitigation  
**Author(s)**: Kai Shu, H. Russell Bernard, and Huan Liu  
**Summary**: The research is aimed at reviewing network properties for studying fake news, introduce popular network types and propose how these networks can be used to detect and mitigate fake news on social media.  
**Keywords**: Fake news, network analysis, social media |
| 16 2010 | **Title**: On deception detection in multi agent systems  
**Author(s)**: Eugene Santos, Jr., and Deqing Li  
**Summary**: The study detect deception by observing the correlations between agents, which can be used to make a reasonable prediction of the agents ‘reasoning processes.  
**Keywords**: Bayesian networks (BNs), deception detection, multiagent system, parametric study |

4.2 Coding and analysis of definitions

Thematic analysis is one of the methods proposed for successful analysis of qualitative research. We selected thematic analysis to perform the coding and analysis on the mapped definitions. Braun and Clarke (2014), defined thematic analysis as a method for systematically identifying, organizing and offering insight into patterns of meaning (themes) across a data set. Thematic analysis is trusted with the ability to let researchers see and make sense of collective or shared meanings and experiences (Braun and Clarke, 2014). The patterns researchers collected by thematic analysis needs to be important regarding a specific topic or the research question. The other reason for researchers to select thematic analysis is its flexibility to let the researchers see the data in different ways (Braun and Clarke, 2014).

The idea behind the thematic analysis is to get a firmer or better definition of fake news or information disorder by looking at how well the detection algorithms define and recognize the reality of fake news or information disorder. The study will look into patterns, shared meanings and perspective of fake news definitions in the 16 articles. The study will assess the definitions at word level. All the terms and words will be examined if they are representing the information disorder they are used to define. By looking into shared meanings, we will try to indicate the information disorder the words and terms should represent or define.
4.2.1 Methods of Thematic analysis

Inductive vs Deductive

Themes or patterns of data can be identified by induction, deduction or by a mix method. Induction is a ‘bottom up’ way. The themes are strongly linked to the data, this means the data are specifically collected for the research in terms of interview or document. It is a data driven approach. (Braun and Clarke, 2006). Deduction on the other hand is based on the researcher’s theoretical or analytical interest and it is an analyst driven approach. This study is theoretical, it has a research question to get answers for. The articles are selected for the purpose of examining their definitions and to determine whether the themes we are looking for are linked to the data.

Semantic vs Latent

Thematic analysis uses semantic and latent approaches for identifying themes. In Semantic, the themes are identified within the explicit or surface meanings of the data and the analyst is not looking for anything beyond what a participant has said or what has been written (Braun and Clarke, 2006). A latent or pragmatic approach detects contextual themes. “the latent level goes beyond the semantic content of the data, and starts to identify or examine the underlying ideas, assumptions, and conceptualizations – and ideologies - that are theorized as shaping or informing the semantic content of the data” (Braun and Clarke, 2006). The thesis discussed (on section 3.1) semantics and pragmatics meanings in relation to defining words, terms and sentences. Since the thesis is concerned with plain definitions without context, we selected semantic approach.

What is considered as a theme?

The most central question in thematic analysis is what can be labeled as a theme or pattern. Based on the argument of Braun and Clarke (2006), any part of the data that is labeled as important by the analyst can be a theme. Braun and Clarke argue that it is all about prevalence both in time and space for each data item. There is no clear-cut answer to the question of what proportion of the data set needs to display evidence of the theme to be considered as a theme (Braun and Clarke, 2006).

4.2.2 Doing the analysis

Our thematic analysis follows the six phases that Braun and Clarke (2006) considered essential in their thematic analysis framework. The phases are not linear so that the analyst can move up and down several times between them.

<table>
<thead>
<tr>
<th>Phase 1: knowing your data,</th>
<th>Phase 4: Reviewing themes,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 2: Generate initial codes,</td>
<td>Phase 5: Define themes,</td>
</tr>
<tr>
<td>Phase 3: Searching for themes,</td>
<td>Phase 6: produce the report.</td>
</tr>
</tbody>
</table>

Table 2: Six phase thematic analysis framework. (Braun and Clarke, 2006).
Phase 1: Knowing your data

The selected data was read repeatedly. It was organized in tabular format for ease of access. The selected definitions were repeatedly checked against the sense of text and utmost care and attention was given to acquire the definitions as presented in the papers.

Phase 2: Generate initial codes

Next the initial codes were generated from the data gathered in phase 1.

<table>
<thead>
<tr>
<th>Article</th>
<th>Data items</th>
<th>Initial codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fake news- is intentionally deceptive news report</td>
<td>Fake news&lt;br&gt;Intentionally deceptive</td>
</tr>
<tr>
<td>2</td>
<td>Three types of fake news; 1) serious fabrication, Fraudulent reporting, falsification, or exaggeration uncovered in mainstream media or participant media, yellow press or tabloids. 2) Hoaxing is another type of deliberate fabrication or falsification in the mainstream or social media. 3) Humorous fakes “in a format typical of mainstream journalism but rely heavily on irony and deadpan humor to emulate a genuine news source, mimicking credible news sources and stories, and often achieving wide distribution (news satire, parody, game shows)”</td>
<td>Fake news&lt;br&gt;Fabrication&lt;br&gt;Fraudulent report&lt;br&gt;Falsification&lt;br&gt;Exaggeration&lt;br&gt;Mainstream media&lt;br&gt;Yellow press&lt;br&gt;Tabloids&lt;br&gt;Hoaxing&lt;br&gt;Deliberate fabrication&lt;br&gt;Fabrication&lt;br&gt;Falsification&lt;br&gt;Mainstream media&lt;br&gt;Social media&lt;br&gt;Mainstream journalism&lt;br&gt;Irony&lt;br&gt;Deadpan humor&lt;br&gt;Mimicking&lt;br&gt;Parody&lt;br&gt;Game shows</td>
</tr>
<tr>
<td>3</td>
<td>Hoaxes- i.e. intentionally crafted fake information</td>
<td>Hoax&lt;br&gt;Intentionally crafted&lt;br&gt;Fake information</td>
</tr>
<tr>
<td>4</td>
<td>Fake news is news content that is fabricated</td>
<td>Fake news&lt;br&gt;Fabricated news content</td>
</tr>
<tr>
<td>5</td>
<td>Fake news- low quality news with intentionally false information</td>
<td>Fake news&lt;br&gt;Low quality news&lt;br&gt;Intentionally false information</td>
</tr>
<tr>
<td>6</td>
<td>Three fake news groups; False news- which is news that is completely fake and is made up by the writers of the articles.</td>
<td>Fake news&lt;br&gt;False news&lt;br&gt;Completely fake&lt;br&gt;Made up</td>
</tr>
</tbody>
</table>
Fake satire news- which is fake news whose main purpose is to provide humor to the readers.

Poorly written news article- which have a certain degree of real news but are not entirely accurate.
fake news and misleading articles are another type of opinion spam.

**Fake news**
- Fake satire
- Humor
- Poorly written
- Not entirely accurate
- Misleading
- Opinion spam

**Poorly written news**

Digital deception-intentional control of information in a technologically mediated environment to create a false belief or false conclusion.

**Digital deception**
- Intentional
- Control of information
- False belief
- False confusion

**Misinformation**
- Unintentional spread of false or inaccurate information. misinformation are rumors, hoaxes, fake news, and conspiracy theories stated as examples of misinformation.

**Misinformation**
- Unintentional
- False
- Inaccurate
- Misinformation
- Rumors
- Hoaxes
- Fake news
- Conspiracy theories

**Fake news**
- Serious fabrications i.e. news items about false and nonexistent events or information such as celebrity gossip

**Fake news**
- Serious fabrication
- False
- Nonexistent
- Celebrity gossip

**Fake news also known as hoax, rumor etc.**

**Fake news also known as**
- Hoax
- Rumor

**Fake news-highly partisan fabricated materials on social media**

**Fake news-highly partisan**
- Fabricated material
- Social media
Table 3: Initial codes

<table>
<thead>
<tr>
<th>Phase</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Fake news</td>
<td>a made up story with an intention to deceive</td>
</tr>
<tr>
<td></td>
<td>Made up story</td>
<td>Intention to deceive</td>
</tr>
<tr>
<td>13</td>
<td>Fake news</td>
<td>is written and published with the intent to mislead to gain financially or politically, often targeting specific user groups. Click-baits, which are distinguished by their sensational, exaggerated, or deliberately false headlines that grab attention and deceive the user into clicking an article with questionable content.</td>
</tr>
<tr>
<td></td>
<td>Intent to mislead</td>
<td>Sensational</td>
</tr>
<tr>
<td></td>
<td>Exaggerated</td>
<td>Deliberately false</td>
</tr>
<tr>
<td></td>
<td>Deceive</td>
<td>Headlines</td>
</tr>
<tr>
<td>14</td>
<td>Misinformation</td>
<td>is conveyed in the honest but mistaken belief that the relayed incorrect facts are true.</td>
</tr>
<tr>
<td></td>
<td>Honest mistake</td>
<td>Incorrect facts</td>
</tr>
<tr>
<td></td>
<td>Unintentionally false</td>
<td>Disinformation</td>
</tr>
<tr>
<td></td>
<td>Deliberately deceive</td>
<td>Hoax</td>
</tr>
<tr>
<td></td>
<td>Deceive</td>
<td>Deliberately fabricated</td>
</tr>
<tr>
<td></td>
<td>Betray an audience</td>
<td>Falsehood</td>
</tr>
<tr>
<td>15</td>
<td>Fake news</td>
<td>is news with intentionally false information</td>
</tr>
<tr>
<td></td>
<td>Intentional</td>
<td>False information</td>
</tr>
<tr>
<td>16</td>
<td>Deception</td>
<td>as information designed to “manipulate the behavior of others by inducing them to accept a false or distorted presentation of their environment—physical, social, or political” and Deception as a “deliberate act perpetrated by a sender to engender in a receiver’s beliefs contrary to what the sender believes is true to put the receiver at a disadvantage.”</td>
</tr>
<tr>
<td></td>
<td>Manipulative</td>
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<td>Distorted</td>
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<td>Misinformation</td>
<td>Mistake</td>
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<td></td>
<td>Wrong information</td>
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</tbody>
</table>

Phase 3: Searching for themes
As shown in section 2.3.3 Fake news, hoax, rumor found in some definitions represent different kinds of information disorder. Using those terms beyond their intended meaning causes confusion. Therefore, in the third analysis phase, overarching themes and sub-themes were identified based on the initial codes.
Intentionally deceptive
Fabrication
Falsification
False and non-existent
Made up
Misleading
False news

Hoax
Deliberate fabrication
Falsification
Intentionally crafted
Fake information

Disinformation
Deliberately deceive
False facts

Digital deception
Intentional control of information
False belief
Manipulative
Distorted
Deliberate

Misinformation
False information
Honest mistake
Incorrect facts
Wrong information
Rumor
Fake

Table 4: Searching for themes

Phase 4: Reviewing themes

Phase 4, according to Braun and Clarke (2006), needs two levels of reviewing and refining. First a review at the level of the coded data. Second, a review at the level of the themes. On this phase we can rework the themes if they seem unfit or create new theme, merge or discard. The selected themes and sub-themes are refined. Some of the themes are collapsed and some merged with other themes and became sub-themes. Because digital deception, disinformation, hoax and intentionally deceptive themes have similar sub-themes and representations, they are merged under disinformation.

<table>
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<tr>
<th>Disinformation</th>
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<td>Falsification</td>
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<td>Intentionally false</td>
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<td></td>
<td>Digital deception</td>
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<td>Misleading</td>
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<tr>
<th>Misinformation</th>
<th>Honest mistake</th>
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<td>Wrong information</td>
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<th>Digital deception</th>
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<td>Distorted</td>
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<td>Deliberate</td>
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</table>

Table 5: Reviewed themes
Phase 5: Defining themes

This is the final step to check if the thematic map helps to capture the essence of each theme and what aspects of the data each theme captures (Braun and Clarke, 2006). The narrative of the theme should be in line with the narrative of the data. In our research, it appeared that the searched themes delivered more themes and sub-themes but at phase 5 it became clear that most of the sub-themes represented similar concepts and definitions. Out of the 16 algorithmic deception detection papers, only 1 paper mentioned and discussed disinformation. According to the studies discussed (on section 2.3) disinformation represents all the information disorders mentioned in the 16 articles. The features of disinformation are found scattered under fake news, hoax and digital deception. Disinformation and misinformation are identified as themes. Even though misinformation agreeably defined as an honest mistake and without intention to deceive, it is still as misleading as disinformation.

Fig 2: Final Thematic Map
5 Results

In this chapter the themes and sub-themes identified in the final thematic map presented and discussed. To evaluate the correctness of theme identification we tried to compare, contrast and relate the themes with the definitions discussed in Chapter 2. The results shown that disinformation is the more appropriate term for expressing and explaining the so called ‘fake news’ phenomenon for the purpose of algorithmic deception detection.

5.1 Identified Themes

Based on the final thematic map disinformation (section 2.3.3) and misinformation (section 2.3.4) were qualified as themes. The sub-themes; deliberate fabrication, intentionally false, digital deception, falsification, misleading, honest mistake, incorrect facts, and wrong information assists to identify disinformation and misinformation as information disorder.

5.2 Disinformation

In this section we discuss how fake news has been defined and interpreted by researchers who are looking for algorithmic based deception detection solution for the fake news epidemic. As discussed in (section 2.3) fake news, with its ambiguity and misuse, is still the favorite term among scholars to represent the spread of false information.

While the debate is proceeding on, several deception detection algorithms are using fake news. Out of the 16 papers 13 of them used ‘fake news’ to discuss information disorder. There are few reasons that make fake news the favorite choice. Fake news is attractive (Difranzo and Gloria, 2018), sensational (Karadzhov et al., 2017), buzzword (Tandoc et al., 2018). In our coding and analysis phases we found that fake news is possessing the definitions of disinformation. The words and sentences used to define fake news are identical with the definitions of disinformation. But we cannot conclude that fake news and disinformation are the same. The definitions given by Fallis (2009, 2015) and others didn’t mention fake news as synonym for disinformation. Newman et al. (2018) argued that there is no agreed upon distinction between fake news, ideologically slanted news, disinformation, misinformation and propaganda. Wardle (2017) defines disinformation as deliberate creation and sharing of information known to be false. This and other definitions put disinformation close to propaganda.

Martin (1982) claims that disinformation was derived from the Russian word ‘Dezinformatsiya’, which defines as the dissemination of false and provocative information. Bittman (1990) agrees with the adaptation of the word by the former soviet but he dispropted on the origin of the word. He claims disinformation has its roots from German. Both Bittman and Martin classified disinformation as a form of propaganda. Fallis (2009), who published papers on disinformation defined it as forged documents, doctored photographs, deceptive advertising, deliberately falsified map and government propaganda. His definition has similar themes as Tandoc et al., (2018) ‘typology of fake news’. Disinformation can adequately represent than fake news. Wardle and Derakhshan (2018) stated the intent of fabricating and disseminating disinformation is to cause harm to a person, social group, organizations or country. The disinformation definitions we have discussed stem from the argument of Publications.europa.eu. (2018). This publication of European
Commission strongly argues that the problem is disinformation not fake news. Recently, the British parliamentary committee published a report about threats of democracy. The committee concluded that the term ‘fake news’ should not be used in the future, citing its misuse and lack of agreed definitions. The committee suggested that the British government should use misinformation and disinformation instead (Waterson, 2018). After reviewing definitions of fake news on 34 scholarly articles, Tandoc et al. (, 2018) concluded that it is an oxymoron to use ‘fake news’ as a term. They argue that ‘news’ represents accurate account of real events and ‘fake’ is for forgery, counterfeit and inauthentic.

Hoax has similarities with disinformation since all the definition features are the same, except hoax uses humor to deceive. Hoax is defined as deceptive, fabricated and fictious (Concise Oxford Dictionary; Wikipedia.com). this is similar to the features of disinformation.

We decided to pick disinformation instead of fake news for the following reasons;

1) we believe fake news lost its academic understanding,
2) fake news is inadequate and ambiguous, and
3) all the attributes listed as definitions of fake news are representative of disinformation.

Based on the thematic analysis we conducted (on section 4.2.2) we identified the following five terms as the constructs of disinformation;

1) Being deliberate fabrication,
2) Being intentionally false,
3) Being digital deception,
4) Being a falsification, and
5) Being misleading.

5.2.1 Deliberate fabrication
Tandoc et al. (2018) defined fabrication as “articles which have no factual basis but are published in the style of news articles”. Papers 2, 3, 4, 7, 9, 11, and 14 used deliberate fabrication and serious fabrication to define fake news. Martin (1982), argued that disinformation is a form of propaganda based on unlawful act or the intent to mislead and deceiving. Bittman (1990) and Martin (1982) stated disinformation as a critical component of propaganda. Disinformation and propaganda have fabrication and the intent to deceive as a common identifier.

5.2.2 Intentionally false
Intentionally false, which is a feature of disinformation, has been defined as inaccurate information that is spread deliberately (Kragh and Åsberg, 2017). Svärd and Rumman (2017) termed it as propaganda. Papers 5 and 15 used the term to define fake news.
5.2.3 Digital deception

Social media which are often seen as disseminators of deceptive, distorted and false information, are blamed as a breeding ground for ideological and hate propaganda. In their large-scale study of definitions of fake news, Tandoc et al. (, 2018) interpreted deception as the degree to which the creator of fake news intends to mislead. Levine (2014) defined deception as intentionally, knowingly and/or purposeful misleading another person. Deception used on Paper 7 and 16. Paper 7 mentioned digital deception twice. In the first one it used as part of fake news definition. In the latter it was defined as digital deception. Only paper 16 used the term deception.

5.2.4 Falsification

Falsification is a term used in the definitions of disinformation and propaganda (Martin, 1982). But the persuasive message it carries is more related to propaganda. Paper 2 used falsification twice to define fake news and hoax. Paper 5 and 15 used intentional false information. Paper 7 used falsified to define fake news.

5.2.5 Misleading

Misleading is the only sub-theme that disinformation and misinformation have in common. Misleading can be regarded as the end result of all the deception activities. Misleading is targeting the audience (Reilly, 2018) to gain profit (Publications.europa.eu., 2018). Misleading was mentioned in paper 6, 7, and 13, together with fake news definitions. Paper 13 defined fake news a misleading for financial and political gain. This definition equated misleading with deception.

5.3 Misinformation

The initial codes pulled out from the data (section 4.2.2) show the problem with defining fake news. A fake news definition presented in paper 7 used deliberate misinformation with other disinformation features like fabricated, falsified and digital deception. Researchers stressed that misinformation is a honest mistake or negligence (Haiden et al., 2018; Bittman, 1990). It is unclear how honest mistake can be defined in conjunction with a deliberate act. Paper 8, after having defined misinformation as unintentional spread of false information, listed fake news and hoax as misinformation. Paper 14 and 16 defined misinformation as honest mistake, unintentionally false and wrong information.

Misinformation can be regarded as unintentional dissemination or sharing of fake news (Wardle, 2017; Kragh and Åsberg, 2018). Based on the analysis we tend to define it is an honest mistake without the intent to deceive (Fallis, 2017).

We identified misinformation as a theme with the following four sub-themes.

1) Honest mistake
2) Wrong information
3) Incorrect facts
4) Misleading
5.3.1 Honest mistake

Honest mistake can be defined as an error or unintentional mistake. It can be termed as genuine mistake, omission, prejudice or sheer ignorance (Bittman, 1990). Paper 14 and 16 used ‘mistake’ to define misinformation.

5.3.2 Wrong information

Bittman (1990) explained that false information can be used as wrong information. On grounds of deliberate action false news can be deceiving but without the intent it is wrong information (misinformation), (Haiden et al., 2018). Unintentional false information can be termed misinformation (Wardle, 2017; Kragh and Åsberg, 2017). Paper 16 defined misinformation as mistakenly providing wrong information. The mixed use of false information as intentionally false and true false seems a bit confusing, but it can be easily identified.

5.3.3 Incorrect facts

Incorrect facts have a close similarity to honest mistake as long as it does not have the intent to deceive. Paper 14 described incorrect facts as a manifestation of misinformation.

5.3.4 Misleading

Misleading is the only sub-theme that disinformation and misinformation have in common. Mislead is defined as “to lead in a wrong direction or into a mistaken action or belief often by deliberate treachery” (Meriamwebester.com). Misleading is the output of intentional actions of disinformation and it is the unwanted or undesired effect of misinformation. Fallis (2015) stated that misinformation does not have the intent to deceive but it is misleading. A European Union publication (2018) on disinformation defined misinformation as misleading and inaccurate information. in their definitions of misinformation paper 8 and 14 failed to include misleading as an effect of misinformation.

5.4 Definitions from the papers

This section presents the definitions we collected from the 16 scholarly articles. The analysis shows that most papers use definitions of fake news that are inadequate and unsatisfactory for research purposes.

Paper 1: Conroy et al. (2015)

Definition(s):

Fake news is Intentionally deceptive news report.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme found in definition</th>
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<tbody>
<tr>
<td>Disinformation</td>
<td>Misleading</td>
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<td>Misinformation</td>
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Table 6 Paper 1: Definition Sub-themes
Paper 2: Rubin et al. (2015)

Definition(s):

Three types of fake news:

1) *Serious fabrication*. Fraudulent reporting, falsification, or exaggeration uncovered in mainstream media or participant media, yellow press or tabloids.
2) *Hoaxing* is another type of deliberate fabrication or falsification in the mainstream or social media.
3) *Humorous fakes* “in a format typical of mainstream journalism but rely heavily on irony and deadpan humor to emulate a genuine news source, mimicking credible news sources and stories, and often achieving wide distribution (news satire, parody, game shows).

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<thead>
<tr>
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<td>Misinformation</td>
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Table 7 Paper 2: Definition Sub-themes

Paper 3: Tacchini et al. (2017)

Definition(s):

Hoax is Intentionally crafted fake information.

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<th>Theme</th>
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Table 8 Paper 3: Definition Sub-themes

Paper 4: Ruchansky et al. (2017)

Definition(s):

Fake news is News content that is fabricated.

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<td>Disinformation</td>
<td>fabrication</td>
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<td>Misinformation</td>
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Table 9 Paper 4: Definition Sub-themes

Paper 5: Shu et al. (2017)

Definition(s):

Fake news is low quality news with intentionally false information.

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<td>Disinformation</td>
<td>Intentionally false</td>
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Table 10 Paper 5: Definition Sub-themes

Definition(s):

Three fake news groups;

*False news*- which is news that is completely fake and is made up by the writers of the articles.

*Fake satire news*- which is fake news whose main purpose is to provide humor to the readers.

*Poorly written news article*- which have a certain degree of real news but are not entirely accurate.

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<td>Disinformation</td>
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Table 11   Paper 6: Definition Sub-themes

Paper 7: Rubin and Chen (2015)

Definition(s):

*Fake news*-Fake, fabricated, falsified, disingenuous, or misleading news reports constitute instances of digital deception or deliberate misinformation.

*Digital deception*-intentional control of information in a technologically mediated environment to create a false belief or false conclusion.

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<th>Theme</th>
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<td>Digital deception</td>
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Table 12   Paper 7: Definition Sub-themes

Paper 8: Shao et al. (2016)

Definition(s):

Misinformation is unintentional spread of false or inaccurate information. misinformation are rumors, hoaxes, fake news, and conspiracy theories stated as examples of misinformation.

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<td>Disinformation</td>
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<td>Misinformation</td>
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<td>Incorrect facts</td>
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<td>Wrong information</td>
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Table 13   Paper 8: Definition Sub-themes


Definition(s):

Fake news- serious fabrications i.e. news items about false and nonexistent events or information such as celebrity gossip.
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<tr>
<td>Disinformation</td>
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<td>Misinformation</td>
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Table 14  Paper 9: Definition Sub-themes

**Paper 10: Tschitschek et al. (2018)**

**Definition(s):**

Fake news also known as hoax, rumors etc.

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Table 15  Paper 10: Definition Sub-themes

**Paper 11: Thorne et al. (2017)**

**Definition(s):**

Fake news is highly partisan fabricated materials on social media.

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<tbody>
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Table 16  Paper 11: Definition Sub-themes

**Paper 12: Pfohl et al. (2017)**

**Definition(s):**

Fake news is a made-up story with an intention to deceive.

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<td>Fabrication</td>
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Table 17  Paper 12: Definition Sub-themes

**Paper 13: Karadzhov et al. (2018)**

**Definition(s):**

Fake news is written and published with the intent to mislead to gain financially or politically, often targeting specific user groups.

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<tr>
<td>Disinformation</td>
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Table 18  Paper 13: Definition Sub-themes
**Paper 14: Kumar et al. (2016)**

**Definition(s):**

Disinformation, Hoax, and misinformation:

*Misinformation* - is conveyed in the honest but mistaken belief that the relayed incorrect facts are true.

*Misinformation* - information that is unintentionally false.

*Disinformation* - false facts that are conceived to deliberately deceive or betray an audience.

*Hoax* is a kind of disinformation.

*Hoax* - A deliberately fabricated falsehood made to masquerade as truth.

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<td>Incorrect facts</td>
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Table 19 Paper 14: Definition Sub-themes

**Paper 15: Shu et al. (2018)**

**Definition(s):**

Fake news is news with intentionally false information.

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<th>Theme</th>
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<tbody>
<tr>
<td>Disinformation</td>
<td>Intentionally false</td>
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Table 20 Paper 15: Definition Sub-themes

**Paper 16: Santos and Li (2010)**

**Definition(s):**

Deception and misinformation

*Deception as information* designed to manipulate the behavior of others by inducing them to accept a false or distorted presentation of their environment—physical, social, or political.

*Deception as a deliberate* act perpetrated by a sender to engender in a receiver’s beliefs contrary to what the sender believes is true to put the receiver at a disadvantage.

*misinformation* is defined as mistakenly providing the wrong information.

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Table 21 Paper 16: Definition Sub-themes
6 Discussion

Fake news detection has become much discussed topic. Fact checking, crowdsourcing and algorithmic detection methods find themselves found in the midst of those debates. We found few research articles that propose algorithmic deception detection as a remedy. Out of those few, there is an even smaller number with definitions of fake news. Those found with definitions are incomplete and do not present a reasoned understanding. Conceptually, the definitions are not well thought through. In any problem-solving mechanism problem definition is the first task that needs to be performed methodically. The study shows that fake news is incorrectly defined and understood.

Combating online fake news with algorithmic deception detection is a relatively young phenomenon. Ten Out of the 16 papers were produced in 2017 and 2018. One of the reasons for the unusually insufficient definition of fake news might be the datasets on which the algorithms were trained. Out of the 16 papers only 1 claimed to have its own dataset.

Out of 16 only 7 papers satisfactorily defined the problem they are trying to tackle. Nine of them defined fake news in just one line using very few words. We found one paper that used only two words to define fake news.

For those who tried to define fake news, disinformation, hoax or misinformation the lack of agreed upon definitions might be a hinderance. The ambiguity and the misuse of fake news can be another reason. Tandoc et al. (2018) explained why we need acceptable fake news definition: “A clear definition of fake news, one that matches its imperial manifestation, can help in testing and building theories in news production”.

Researchers from linguistic, journalism, computer science and other fields of study need to work together to come up with a definition that can be accepted as an academic definition.

Computer science researchers keep using the term ‘fake news’ while others are abandoning it. Governments, institutions and European union publications are refraining from using fake news citing its ambiguity and misuse.

Our results have shown that disinformation can replace fake news. Most of the academic meanings given to fake news belongs to disinformation. To clear the confusion created by the many faces of fake news, disinformation is the most suitable replacement.
7 Conclusion

Detecting fake news in the era of social media without technological intervention is unthinkable. Fact checking sites, fake website identifiers, applications, plugins and deception detection algorithms are helping to combat fake news. They are being used to shield social liberties exemplified by elections from foreign interference and intrusion. The internet and, mainly the social media are the new battleground for an information war. A country, a business or a person can lose fortunes by a single bit of false information. Candidates for political office are getting elected with the help of fabricated and falsified information.

Studying how fake news, disinformation, hoax and misinformation are defined for the purpose of algorithmic deception detection has challenges. In our research we were able to identify only 16 recent publications trying to define fake news. Only 7 out of 16 papers satisfactorily defined the problem they are trying to tackle. The result shows that algorithmic based research papers have a great difficulty in defining fake news, disinformation, hoax and misinformation, and even when they produce a definition it is unsatisfactory and the two hypotheses (section 4.1) proved to be true.

Algorithmic solutions have a huge potential in combating fake news and other information disorder. In regard to this research the deception detection algorithmic solutions fail short to deliver the information needed for the analysis. If more than half of the papers examine defined fake news inadequately, one should wonder about how successful their algorithms are in identifying and detecting false information.

7.1 Future research

False news fabrication and falsification are on the upswing and becoming increasingly complex. National states are involved in fabricating and disseminating false information by utilizing their human and technological power. This interference showed its potential on the 2016 US election and during Brexit referendum.

To minimize the attacks and protect civil liberties a new approach is needed. Most of the algorithmic deception detection solutions are engaged on detecting the semantic meaning of words. That is not enough. Combating false information requires algorithms that can identify the context and the hidden meanings in words, and therefore a search for pragmatic meaning.

Understanding and utilizing the pragmatics of meaning demand a novel approach and techniques on top of the usual training of algorithms on existing datasets. Pragmatics analysis can create a lot of room for future research in the field.

Several deception detection algorithms are being developed to combat fake news. To successfully combat fake news, the phenomena needs to be well defined, categorized and understood.

This work can be used as a stepping stone by future researchers who are interested to develop better performing fake news deception detection algorithms because of a better definition and understanding of the problem.
Bibliography


