

False News on Social Media

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Abstract. Most of current methods on detecting false news on social media have been developed along two mainstream thought processes: 1) training machine learning models to detect, classify, or cluster false news, or 2) statistical analysis of false news and using network-based techniques to understand how misinformation spreads. However, none of these approaches alone can adequately analyze false news and the ecosystem within which it grows and interacts with. Considering this shortcoming and great demand for better analytical platforms, we propose to develop a pioneering method that combines Artificial Intelligence with experimentally-validated psychological theories to assess the likelihood of false information and the underlying psychological reasons behind spread of false news. Through this platform, we not only use Machine Learning and Natural Language Processing to train advanced and enhanced linguistic models for false news detection, but additionally investigate and validate the psychological factors driving the individuals to believe and spread false news. In particular, we test the hypothesis that more semantically coherent news documents are more likely to be shared on social media.

Keywords: False news · Social media · Natural language processing · Coherence.

1 Introduction

Over %67 of Americans received their news from social media in 2017. News on social media may contain false information to deliberately mislead people. While misinformation campaigns themselves are not a new phenomena, the speed and scale at which they can spread through online platforms have posed new challenges to fabrics of society with grave implications in politics, economy and social and psychological issues. However, looking only at the technological aspects of false news, such as automated bots, does not capture the whole story. The reality is that humans themselves play a major role in spreading false information [4]. As an example, %75 of Americans who recognized a fake news story from the US 2016 presidential election still viewed the story as accurate. This is why we strongly believe a comprehensive platform that integrates the psychological and technological factors of spreading false news on social media together has great application in providing novel insight to fake news phenomenon and have wide-ranging applications in a variety of different fields.

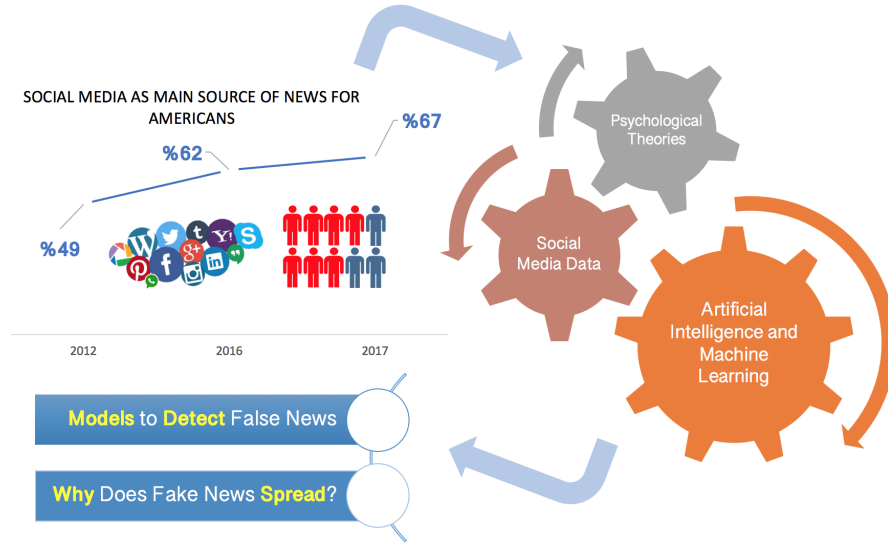


Fig. 1. The overview of our study.

2 Approach

The core engine of our platform can be split into two sections 1) generating structured datasets and 2) training linguistic models to investigate the psychological factors that affect humans in believing and spreading false information.

Data: Rich data resources are one of the most important elements of data science related tasks. The true power of deep learning algorithms not only comes from their architecture but equally important from the availability of appropriate datasets large in size and with rich set of labels. There is clearly a huge lack of useful and structured datasets with rich set of annotations and gold labels to be used in development of fake news analytics platforms [2]. We aim to address this need by initially collecting raw data from online sources and subsequently generating a comprehensive corpus with unique set of features and gold labels. We have already started the data collection process in collaboration with some online and well-known resources and startup companies. While the raw data provided by these resources is a great starting point, we aim to structure the data with appropriate labels required for use by Machine Learning (ML) and Natural Language Processing (NLP) algorithms that we will develop.

We use some existing false news datasets in our experiments in addition to generating our own data. In particular, we reformatted and cleaned a dataset of over 400 news documents labeled as either false or real published by Shu and colleagues [3]. This dataset has the number of users who shared each news document. Such a feature makes us able to see if there is any meaningful relation

between the characteristics of news documents and the number of times they are shared by people.

Table 1. Fake news dataset statistics.

Fact checker	Fake	Real	Total
PolitiFact	114	117	231
Buzzfeed	89	90	179
		Total	410

Models and Theories: As noted earlier, training ML models to detect false news or developing fact-checking platforms may not be enough to overcome the false news problem. Our platform aims to provide a deeper understanding of psychological reasons behind why people believe and spread false news on social media and what kind of text they are more likely to share. For example, it is shown that false rumors are significantly more "novel" than the truth on social media [4]. We are looking for features in addition to "novelty" to see what kind of text documents are more likely to be shared by people on social media. In particular and in our current study, based on the fact that more semantically coherent stories are more likely to be accepted by people, we are doing experiments to see if there is any relation between the degree to which news stories are coherent and the number of individuals who share them. We use topic models including Latent Semantic Analysis (LSA) and Latent Dirichlet Allocation (LDA) to measure the semantic relatedness of segments of news documents. Moreover, we build models using decision making algorithms including Fuzzy-Trace Theory (FTT) and further test and validate these models using ML techniques. FTT is a theory of decision under risk that focuses on the meaning of the data in a context-dependent manner. This capability incorporates to the platform a representation of how individuals interpret a message and predict how they act on the extracted representation rather than on the message itself [1].

3 Conclusion

In summary, our analytic engine will initially provide a rich set of labeled data specifically tailored for false news analysis. Following this initial phase, we will develop ML-powered NLP models of psychological factors that drive the behavior of individuals for believing and spreading of false news on social media. Specifically, we test the hypothesis that more coherent news stories are more likely to be spread and shared on social media. While the focus on this research is false news in the context of social media and media more generally, the developed platform and datasets can clearly find wider applications in many other fields such as business or political campaigns.

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