

FAKE NEWS DETECTION TECHNIQUE USING TFIDFVECTORIZER AND PASSIVEAGGRESSIVE CLASSIFIER IN PYTHON*

BY

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ABSTRACT

For news consumption, social media could be an uncertain weapon. On the one hand, people use social media to find and consume news because of its low cost, easy access, and rapid transmission of information. On the other hand, it allows for the widespread dissemination of fake news, i.e. inferiority news based on intentionally inaccurate information. The widespread dissemination of fake news has the potential to have disastrous consequences for people and society. As a result, spotting false news on social media has recently been a popular topic that has gotten a lot of press. Pretending that news detection on social media has unique traits and obstacles that render existing detection algorithms from traditional journalism ineffective or not applicable. First, fake news is intended to induce readers to accept misleading information, making it difficult and time-consuming to spot supported news content. As a result, we'd like to include auxiliary data, such as user social media engagements on social media, to aid in making a decision. Second, utilising this auxiliary data is difficult in and of itself, as users' social interactions with fictitious news produce huge, incomplete, unstructured, and noisy data. Because the challenge of detecting fake news on social media is both challenging and relevant, we've decided to conduct this poll to aid in the investigation. We will provide a full evaluation of police investigation, fake news on social media, as well as fake news characterizations on scientific disciplines and social theories, existing algorithms from a knowledge mining perspective, analysis metrics, and representative datasets during this survey. We'll also talk

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about related research topics, unresolved questions, and future research paths for detecting fake news on social media.

KEYWORDS

Fake News Detection, TFIDFVectorizer, PassiveAggressive Classifier, Python.

1 Introduction

In the last decade, social media has become one of the most essential sources of information for individuals all over the world. Using social media to get news, on the other hand, is a double-edged sword. On the one hand, it is low-cost, readily available, and extensively distributed. However, it comes with the risk of being exposed to "fake news," which contains unregulated or even intentionally incorrect material.

Fake news widespread distribution has recently become a global problem and a threat to western democracy. The massive transmission of false news in the run-up to the 2016 presidential elections in the United States and the Brexit referendum in the United Kingdom has been a focal point of the debate over these political events and charges of public opinion manipulation. Because the stakes are so high on both a social and economic level, monetary.

Automatically detecting fake news is a difficult issue that defies current content-based research methodologies. One of the main reasons is that news analysis is often complex and requires awareness of political or social meaning, or "common sense," which even the most advanced natural language processing algorithms lack. Furthermore, bad actors create false news that appears to be actual news but contains deceptive or malevolent facts that are difficult to detect even by trained human specialists.

I believe we've all seen news reports on social media that appear to be too good to be true. We occasionally come across different facts regarding the same topic and question whether one is correct. We put ourselves in a dilemma by attempting to determine which source to believe. That is, until now. This task can be made easier with Python and Machine Learning. Using classifier techniques, we can train a model that can predict if a "news" piece is true or false. The goal of this project is to identify bogus news in order to reduce the problems that people/users suffer. Passive Aggressive Classifier is used in the proposed system. This model can be used to help people keep aware of bogus news that they encounter on a frequent basis on social media. The administrator will provide the system with data-driven parameters that will allow the system to distinguish between true and fraudulent news on social media. We classified the fake news in this project. The main objective for identifying fake news is to warn users and the general public about the scam news/false news that is spreading on social media. As a result, it is beneficial to classify bogus news in order to assist individuals in making decisions. It can also have an

emotional impact on people, making it a crucial motivator for detecting fake news. As a result, it's critical to distinguish between true and false news. To classify the fake news, we employed an open source data set. The results are assessed in terms of the most notable accuracy achieved and the minimum features picked. TfidfVectorizer is used to reach a conclusion for the given dataset.

2 Literature Review

2.1 Literature Review Table

Sr No.	Title of Research paper	Author	Methodology	Strengths	Future Scope
1	Fake News Detection : A data mining perspective	Kai Shu, Amy Silva, Suhang Wang, Jiliang Tang and Huan Liu	Data Mining, Feature Extraction	This model Helps Truth Discovery	Future directions in fake news detection research that are promising and will broaden the area to include other applications
2	Fake News Detection using Passive-Agressive Classifier	SaloniGupta, Priyanka Meel.	Passive-Agressive Classifier	Passive-Agressive Classifier gives good results	Will Help to detect faux news
3	Fake News Detection on social media using geometric deep learning	F Monti, F Frasca, D Eynard, D Mannion	Geometric Deep Learning	This model Helps to Check Facts	Will Help to Reduce Fake News
4	Defending Against Neural Fake News	Zellers R, Holtzman A, Rashkin H, Bisk Y.	Neural Networks	Helps People to Classify between fake and real news	Countering Faux News
5	Event adversarial neural networks for multi-modal fake news	Wang Y, Ma F, Jin Z, Yuan Y, Xun G, Jha K, Su L and Gao	EANN	This model can can outperform the state-of-the-art methods, and learn	Proposed model is effective and can outperform the state-of-the-art

	detection.	J.		transferable feature representations.	models.
6	Fake news detection as natural language inference.	Yang K.C., Niven T. and Kao H.Y.	NLP	Able to exploit transitive relations between them to reliably improve our performance.	Intend to further investigate the transitivity method for data augmentation
7	" liar, liar pants on fire": A new benchmark dataset for fake news detection.	Wang W.Y.	Hybrid CNN	When meta-data and text are combined, major gains in fine-grained fake news detection can be made.	This model can also be used for stance classification, argument mining, topic modeling, rumor detection, and political NLP research.
8	A new multimodal benchmark dataset for fine-grained fake news detection.	Nakamura, K., Levy, S. and Wang, W.Y.,	Data Mining	It performs very well as a universal sentence embeddings generator.	Provide a more in-depth analysis in comparison to another sizable dataset
9	Weak supervision for fake news detection via reinforcement learning	Wang Y., Yang W., Ma F., Xu J., Zhong B., Deng Q. and Gao J.	Reinforcement learning techniques	Dynamic nature of news make it infeasible to obtain continuously labeled high quality samples for training effective models.	A novel framework that can leverage user reports as weak supervision for fake news detection.
10	Some like it hoax: Automated fake news detection in social networks.	Tacchini E., Ballarin G., Della Vedova M.L., Moret S. and de Alfaro L.	ogistic Regression and Harmonic BLC Algorithm	Both logistic regression and the harmonic BLC algorithm achieve high accuracy.	Techniques proposed may be sufficiently robust for an extensive application in a real-world scenario.

11	FANG: Leveraging social context for fake news detection using graph representation.	Nguyen V.H., Sugiyama K., Nakov P. and Kan M.Y.	NLP	Able to exploit transitive relations between them to reliably improve our performance.	Intend to further investigate the transitivity method for data augmentation
12	Detecting incongruity between news headline and body text via a deep hierarchical encoder.	Yoon, S., Park, K., Shin, J., Lim, H., Won, S., Cha, M. and Jung, K.	Deep Hierarchical model	High accuracy achieved by using Deep Hierarchical model	Will Help to Reduce Fake News
13	A hybrid deep model for fake news detection.	Ruchansky N., Seo S. and Liu Y.	Neural Networks	This model Helps to Check Facts	Will Help to Reduce Fake News
14	Where Are the Facts? Searching for Fact-checked Information to Alleviate the Spread of Fake News.	Vo N. and Lee K.	Multimodal Attention Network	Helps People to Classify between fake and real news	Countering Faux News
15	BanFakeNews: A dataset for detecting fake news in bangla.	Hossain M.Z., Rahman M.A., Islam M.S. and Kar S.	NLP	This model Helps Truth Discovery	Future directions in fake news detection research that are promising and will broaden the area to include other applications

2.2 Literature Review Description

While many people on social media are genuine, others are nasty, and others aren't even real people. The low cost of creating social media accounts encourages malicious user profiles such as facebook bots, cyborg users, and trolls. A social bot is a social media account that is

controlled by a computer algorithm that creates content and interacts with humans (or other bot users) on the platform. Social bots have the potential to evolve into hostile entities with the goal of causing harm, such as through exploiting and disseminating misleading information on social media. According to studies, social bots impacted online arguments about the 2016 US presidential election on a large scale, with over 19 million bot accounts tweeting in favour of either Trump or Clinton in the week preceding up to election day.

Misinformation refers to information that is wrong or misleading. It could spread unintentionally as a result of honest reporting errors or misunderstandings. False information, on the other hand, is intentionally disseminated to confuse or foster a biased goal. Falsification, like disinformation, is designed to perplex individuals; it is defined as amusing a person with false information.. While satirical news is meant to entertain and outrage the audience, it, like hoaxes, can be hazardous if distributed out of context. As a result of the proliferation of social media for various financial and political goals, false news has emerged.

Social media has become one of the most essential news vehicles for millions of people throughout the world due to its low cost, easy access, and rapid dissemination. This, however, comes at the cost of questionable credibility and a significant risk of being exposed to "fake news," which is deliberately crafted to deceive readers.

Dual-use has been questioned in light of recent advances in natural language processing. While applications like summarization and translation are useful, the underlying technology could enable opponents to create neural fake news, which is targeted propaganda that closely resembles actual news.

Modern computer security relies on thorough threat modelling, which entails identifying potential threats and weaknesses from the attacker's perspective and investigating potential mitigations. Similarly, good neuronal defences must be developed. First, we must assess and characterise the hazards posed by fake news prototypes.

Social media's recent expansion has significantly changed how individuals receive information. People are increasingly consuming news through social media, which may deliver real-time, full multimedia information on global events. When compared to traditional text coverage, news with photos and videos can tell a better story and pique the interest of readers. Fake news, which frequently includes misleading or even manufactured visuals, takes use of this to perplex readers and spread quickly.

Recent studies have adopted a different approach, focusing on the qualitative characteristics of news delivery. When social users are presented with fake vs true news, they interact in different ways [17, 25]. For example, the bogus news that was displayed received a large number of

engagements shortly after it was released. The majority of them are verbatim re-circulations, with the negative attitude of the original post emphasised by the usual awful material of fake news.

The use of false or erroneous facts in journalism has sparked a severe social problem (Kwon et al. 2013). The majority of information shared on the internet is unverifiable, exposing our civilization to unforeseen risks. News headlines are notorious for creating first impressions in readers and, as a result, deciding the viral potential of news articles on social media (Reis et al. 2015). People in digital surroundings that are saturated with information are less inclined to read or click on the complete contents, preferring instead to read news headlines (Gabiolkov et al. 2016). Similarly, a lot of news sharing is based on headlines; people will spread news headlines without even reading the entire storey. On the other hand, the headline's first impression is so strong that it lasts even after reading the whole news storey. 2014 (Ecker et al.) As a result, if a news title does not adequately reflect the news narrative — or is incongruent — viewers may advocate for exaggerated or misleading facts, which can be difficult to deny.

2.3 There are a total of 2.3 footnotes. The footnote's superscript numeral appears in the text either directly after the word to be discussed or – in the case of a sentence or phrase – after the punctuation mark (comma, semicolon, or period). Footnotes should be at the bottom of the regular text space, with a 5 cm line directly above them.

Nonetheless, there are three characteristics of false news that are commonly acknowledged: the text of a post, user reaction, and source users who promote it. Existing research has mostly focused on adapting solutions to a specific feature, which has limited their applicability and generalizability. Because of the current political climate and growing concern about its detrimental consequences, On social media, there has been a resurgence of interest in fake news.

Fake news continues to proliferate on social media, despite the development of several fact-checking programmes in academia and business. These programmes primarily focus on fact-checking, but they also ignore site users, who are the primary disseminators of disinformation. How can we use fact-checked data to educate users about the dangers of fake news? What can we do to keep users from spreading misleading information? To address these concerns, we propose a new system for finding fact-checking articles that address the content of a user's initial tweet (which may contain disinformation). The hunt will notify fake news posters and online users (e.g., the posters' followers) to the spread of misleading material, discouraging them from doing so and increasing the amount of verified content on social media.

Because of the losses that can be generated by the quick spread of fake news in numerous industries such as politics and finance, the academic community has focused on automatic detection of fake news using linguistic analysis. On the other hand, such approaches are primarily developed for English, leaving low-resource languages out of the picture. The dangers offered by phoney and manipulated information, on the other hand, are significant. For a language with limited resources, such as Bangla, fake news detecting systems. We also undertake a dataset assessment and develop a benchmark framework for detecting Bangla fake news using cutting-edge NLP techniques. This framework is built using both traditional language characteristics and neural network-based techniques.

3 Technology used for this Model :

On Jupyter Notebook, we constructed the Fake News Detection project. This model was created to accurately classify a piece of news as FAKE or REAL.

Using sklearn, we develop TfidfVectorizer for our dataset. A PassiveAggressive Classifier is then used to fit the model. Finally, our model's accuracy score and confusion matrix show how well it works. The accuracy was 92.82 percent.

- What is TFIDFVectorizer??

TF (Term Frequency) : - The Term Frequency of a word is the number of times it appears in a text. If a word appears more often than others, a higher value indicates that the text is a good fit when the term is part of the search words.

IDF (Inverse Document Frequency) : - Words that appear often in one text but not in others may be considered meaningless. The IDF is a metric for determining how important a word is across the entire corpus.

The TfidfVectorizer transforms a collection of raw documents into a TF-IDF function matrix.

- What is a Passive Aggressive Classifier?

Passive-aggressive Algorithms for online learning are aggressive algorithms. When a correct classification result is obtained, such an algorithm remains passive; but, when a miscalculation happens, it becomes active, updating and modifying. It does not converge in the same way that most other algorithms do. Its goal is to make updates that fix the loss while leaving the weight vector's norm unchanged.

So with this model, we got 589 true positives, 587 true negatives, 42 false positives, and 49 false negatives.

4 Architecture

Here is the Artchitecture of my Model Which I have built to classify between Real and Fake News



Fig. 1 Fake News Detection Architecture

5 Survey conducted for this Model

● I have conducted a survey to know why is it important to detect fake news. We asked people's some questions like :

1. What are the major Issues you are facing due to Fake News?
2. What do you think what are the main reason/focus of Fake News Forwarding?
3. Does the example hyperlink to other quality sources? In other words, they haven't been altered or taken from another context? Etc

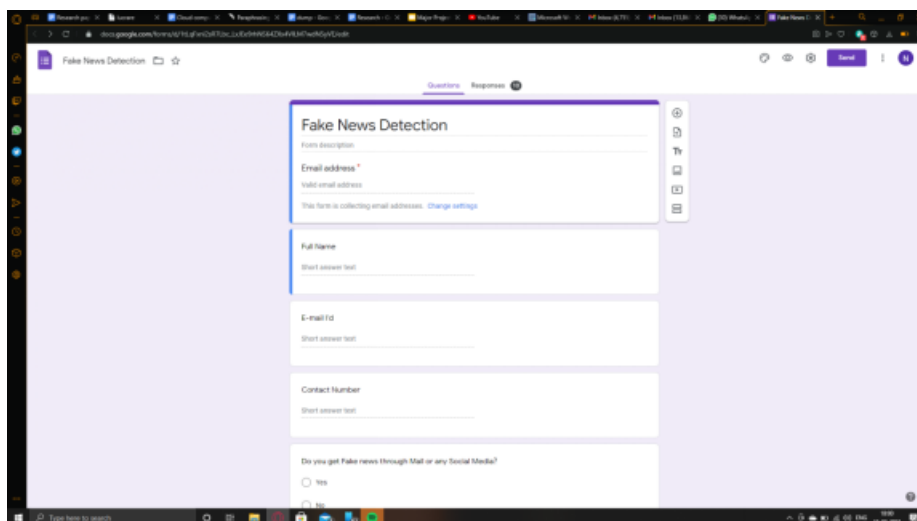


Fig 2.1 Google Form for the survey

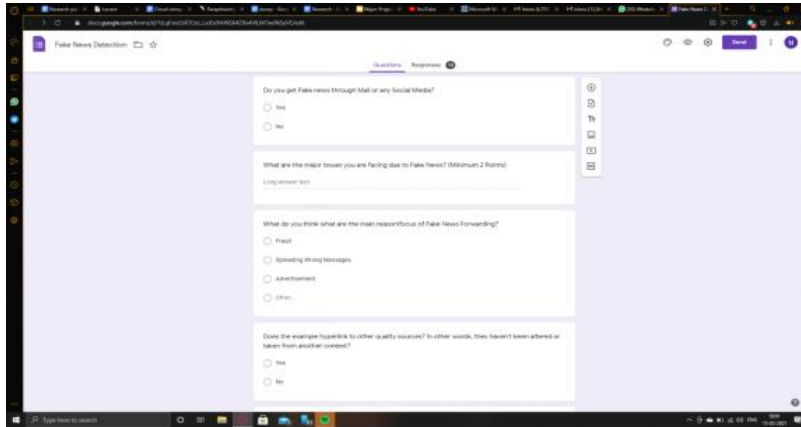


Fig 2.2 Questions asked regarding Fake News

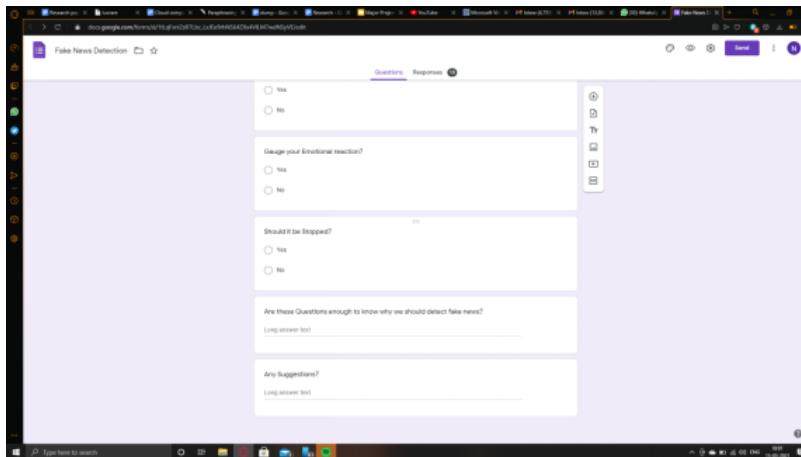


Fig 2.3 Questions asked regarding Fake News

●Responses of the survey

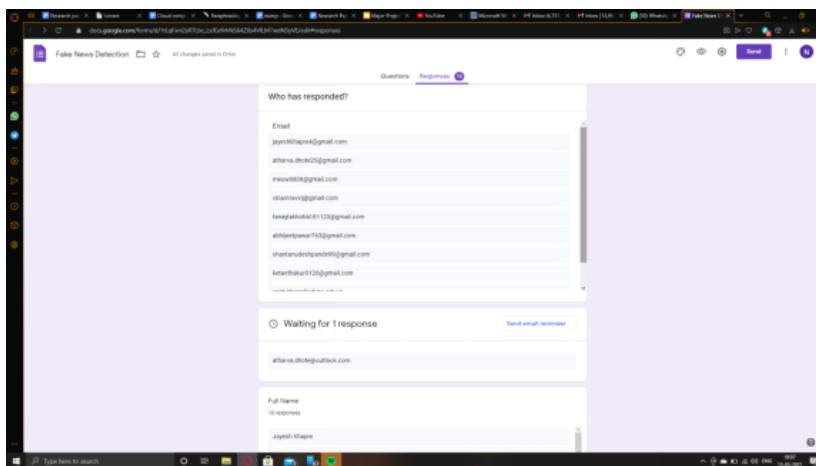


Fig 2.4 Responses for the Google Form

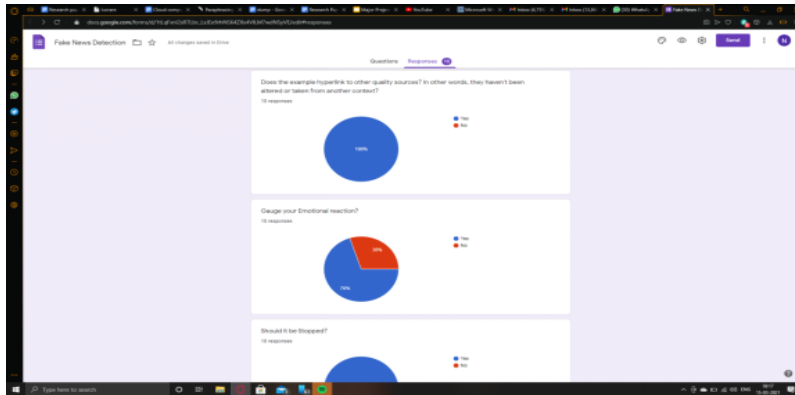


Fig 2.5 Answers received for the questions asked

6 Future Trends

False information being widely disseminated on social media has become a global problem, influencing public opinion and posing a threat to social and political development. False information detection (FID) has become a prominent research topic in recent years. We've seen that being a promising and fast evolving research subject, new research issues and approaches in FID have gotten a lot of attention. As a result, a comprehensive examination of the most recent FID research trends is required. We begin with a brief history of FID research, followed by a discussion of numerous current research issues and methodologies, including early detection, multimodal data fusion detection, and explanatory detection. We then look at crowd intelligence extraction and use in FID, which appears to be a viable solution to cope with FID issues. Finally, we discuss outstanding concerns and future research topics in FID, including model adaptivity/generality to new events, adoption of newer machine learning models, crowd wisdom aggregation, adversarial attack and protection in detection models, and others.

7 Conclusion

With the growing opprobrium of social media life, a rising number of people prefer to get their news from the internet rather than traditional news sources. In any event, internet-based living has been promoted to disseminate false information, which has serious negative consequences for both individual clients and larger communities. In this study, Machine Learning techniques are used to tackle the problem of detecting fake news. As a result, the Passive-Aggressive Classifier is employed since it has the highest accuracy of all the classifiers, at 92.82 percent. As a result, it is advocated that the problem of identifying fake news be addressed.

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