Fake News Classification

Submitted by:

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Abstract

'Fake news', broadly defined as false or misleading information masquerading as legitimate information, is frequently asserted to be pervasive online with serious consequences for democracy

Fake news, lack of authenticity of information has become a major issue affecting businesses and society, both printed and digital media. At the time of crisis, fake news creates chaos and disturbances affecting people personal and professional life.

On social networks, the reach and effects of information spread occur at such a fast pace and so amplified that distorted, inaccurate, or false information acquires a tremendous potential to cause real-world impacts, within minutes, for millions of users.

Misinformation and disinformation produced is directly related to the author(s) is and the different reasons why it is created. They may be: Someone wanting to make money, regardless of the content of the article (for example, Macedonian teenagers),Satirists who want to either make a point or entertain you, or both, Poor or untrained journalists - the pressure of the 24 hour news cycle as well as the explosion of news sites may contribute to shoddy writing that doesn't follow professional journalistic standards or ethics and many more reasons.

This paper examined the news context along with its headlines and author name to classify fake news. It is been observed that there is no relationship between author having highest frequency and fake news, authors Pam Key is observed to be the most authentic writer. More than 95% of his news are true.

The contexts of news and headlines are pre-processed with the help of tf idf, converting it into vectors

MultinomialNB, Knn, DecisionTree and RandomForest models are used for classification of fake news. Decision tree model is the best performing model with accuracy score of 89%.

Introduction

With over 560 million users as per Statista report, India today has achieved almost 50% internet penetration; it is home to the second-largest internet user base in the world, following China.

However, India's digitalization is a recent phenomenon—internet penetration was only 27% just five years ago. This rapid spread in internet usage was partially made possible by the availability of affordable mobile data in India. Indeed, mobile phones and social media, particularly mobile-based applications like WhatsApp and Facebook, are the primary mediums through which most smartphone users communicate and access information.

During a public health emergency, staying informed and having access to correct information is vital. While on the one hand, internet penetration figures look promising, on the other, it brings a critical challenge—the spread of misinformation ("false or inaccurate facts") through social media.[2]

We use words like hoax, misinformation, and untruth, but the deceptively simple "fake news" describes one of the most common modern causes of reputation issues so very well. Media outlets today are in a frenzy of competition, each battling to publish stories that will get generate more buys, more clicks, and more ad revenue. At the same time, the public is primed for outrage and full of the natural human desire to witness and discuss a sensational event. [1]

The ongoing covid-19 crisis has made this vulnerability highly visible, with numerous pieces of misinformation related to covid-19 circulating through social media.

Some notable examples include: "free Netflix subscription to stay at home safely," "gargling a cure for covdi-19 as the virus remains in the throat for four days," "use sesame oil to block the virus from entering your body," "eat garlic to cure covid," "tax refunds due to the pandemic."

Social media:

Social media platforms are a double-edged sword; on the one hand, they allow for social connectedness in a time of social distancing. On the other, functionalities that facilitate "conversation" and, "sharing" contrarily lead to a decline in reflective thinking, inducing the sharing of quick and superficial thoughts and the speedy diffusion of unverified facts. In turn, users become both contributors and victims of misinformation.

"Forwarding", "sharing", and "retweeting" content allows users to exchange, distribute, and receive content at an unprecedented level; however, this may have damaging consequences when unsuspecting users are exposed to harmful and undesirable content.[2]

Most social media platforms allow users to form groups based on their common interests; however, such virtual groupings may lead to the creation of echo-chambers in which members' own beliefs are

amplified and reinforced. Such echo-chambers also make unverified messages appear more trustworthy. When a trusting group member receives a certain piece of information, they might think that the information is correct because it is from their “own” people.

The flow of misinformation on social media depends on human as well as technical factors. Human biases and motivations are responsible for the initiation of misinformation; however, as soon as users start engaging with the message by “liking”, “replying”, “commenting”, “forwarding”, and “sharing”, technology accelerates message diffusion to an unparalleled scale.

Authors:

Misinformation and disinformation produced is directly related to the author(s) is and the different reasons why it is created

They may be:

- Someone wanting to make money, regardless of the content of the article (for example, Macedonian teenagers)
- Satirists who want to either make a point or entertain you, or both
- Poor or untrained journalists - the pressure of the 24 hour news cycle as well as the explosion of news sites may contribute to shoddy writing that doesn't follow professional journalistic standards or ethics
- Partisans who want to influence political beliefs and policy makers

The **technological ease** of copying, pasting, clicking and sharing content online has helped these types of articles to proliferate. In some cases, the articles are designed to provoke an emotional response and placed on certain sites ("seeded") in order to entice readers into sharing them widely. In other cases, "fake news" articles may be generated and disseminated by "bots" - computer algorithms that are designed to act like people sharing information, but can do so quickly and automatically.[3]

Fake news is a major issue, it creates lots of noise and disturbances, economically and also affecting people personally. Analysing the current scenario it seems controlling it 100% is quiet impossible but Various solutions are implemented, one of them is machine algorithm which can classify fake news based on context, headlines, author names etc. These algorithms could help upto a great extend to minimize fake news spread.

Problem Statement:

The authenticity of Information has become a longstanding issue affecting businesses and society, both for printed and digital media. On social networks, the reach and effects of information spread occur at such a fast pace and so amplified that distorted, inaccurate, or false information acquires a

tremendous potential to cause real-world impacts, within minutes, for millions of users. Recently, several public concerns about this problem and some approaches to mitigate the problem were expressed

Review of Literature:

There has been no universal definition for fake news, even in journalism. A clear and accurate definition helps lay a solid foundation for fake news analysis and evaluating related studies. Here we (I) distinguish between several concepts that frequently co-occur or have overlaps with fake news, (II) present a broad and a narrow definition for the term fake news, justifying each definition, and (III) further discuss the potential research problems raised by such definitions.

I. Related Concepts. Existing studies often connect fake news to terms and concepts such as deceptive news [Allcott and Gentzkow 2017; Lazer et al. 2018; Shu et al. 2017], false news [Vosoughi et al. 2018], satire news [Rubin et al. 2015; Tandoc Jr et al. 2018; Wardle 2017], disinformation [Kshetri and Voas 2017; Wardle 2017], misinformation [Kucharski 2016; Wardle 2017], cherry-picking [Asudeh et al. 2020], clickbait [Chen et al. 2015] and rumor [Zubiaga et al. 2018]. Based on how these terms and concepts are defined, we can distinguish one from the others based on three characteristics: (i) authenticity (containing any non-factual statement or not), (ii) intention (aiming to mislead or entertain the public), and (iii) whether the information is news. Table 1 summarizes these related concepts based on these characteristics. For example, disinformation is false information [news or not-news] with a malicious intention to mislead the public

II. Defining Fake News. Challenges of fake news research start from defining fake news. To date no universal definition is provided for fake news, where it has been looked upon as "a news article that is intentionally and verifiably false" [Allcott and Gentzkow 2017; Shu et al. 2017] (deceptive news), "a news article or message published and propagated through media, carrying false information regardless of the means and motives behind it" which overlaps with false news, disinformation [Kshetri and Voas 2017], misinformation [Kucharski 2016], satire news [Rubin et al. 2015], or even the stories that a person does not like (considered improper) [Golbeck et al. 2018]. Furthermore, what news is has become harder to define as it can range from an account of a recent, interesting, and significant event, to a dramatic account of something novel or deviant; in particular, "the digitization of news has challenged traditional definitions of news. Online platforms provide space for non-journalists to reach a mass audience." [Tandoc Jr et al. 2018]. Under these circumstances, we first broadly define fake news as:

Definition 1 (Broad definition of fake news). Fake news is false news

where news broadly includes articles, claims, statements, speeches, posts, among other types of information related to public figures and organizations. It can be created by journalists and non-journalists. Such definition of news raises some social concerns, e.g., the term “fake news” should be “about more than news” and “about the entire information ecosystem.” [Wardle 2017] The broad definition aims to impose minimum constraints in accord with the current resources: it emphasizes information authenticity, purposefully adopts a broad definition for the term news [Vosoughi et al. 2018], and weakens the requirement for information intention due to the difficulty in obtaining the ground truth (true intention). This definition supports most existing fake-news-related studies and datasets, as provided by the existing fact-checking websites (Section 2.1 provides a detailed introduction). Current fake news datasets often provide ground truth for the authenticity of claims, statements, speeches, or posts related to public figures and organizations, while limited information is provided on intentions. We provide a more narrow definition of fake news, which satisfies the overall requirements for fake news as follows.

Definition 2 (Narrow definition of fake news). Fake news is intentionally false news published by a news outlet.

This narrow definition supports recent advancements in fake news studies [Allcott and Gentzkow 2017; Shu et al. 2017]. It addresses the public’s perception of fake news, especially following the 2016 U.S. presidential election. Note that deceptive news is more harmful and less distinguishable than incautiously false news, as the former pretends to be truth to mislead the public better. The narrow definition emphasizes both news authenticity and intentions; it also ensures the posted information is news by investigating if its publisher is a news outlet (e.g., CNN and New York Times). Often news outlets publish news in the form of articles with fixed components: a title, author(s), a body text, image(s) and/or video(s) that include the claims made by, or about, public figures and organizations.

Both definitions require the authenticity of fake news to be false (i.e., being non-factual). As the goal is to provide a scientific definition for fake news; hence, news falsity should be derived by comparing with objective facts and not with individual viewpoints (preferences). Hence, it is improper to consider fake news as articles that do not agree with individuals’ or groups’ interests or viewpoints, which is sometimes how the term fake news is used by the general public or in politics [Golbeck et al. 2018]. Such falsity can be assigned to the whole or part of the news content, or even to true news when subsequent events have rendered the original truth outdated (e.g., “Britain has control over fifty-six colonial countries”). In this general framework, a more comprehensive strategy for automatic fake news detection is needed, as the aforementioned fake news types emphasize various aspects of detection.

Objectives:

- To find relationship between author of news article and fake news.
- To build machine learning algorithms to classify fake news.

Significance of the Study:

This study helps to understand the relationship between author of news article and fake news. It also helps to identify fake news articles which will be beneficial for readers.

Methodology

This research has used:

- Univariate analysis
- Natural Processing Languages and
- Machine Learning Algorithms

To study the relationship between independent variable and dependent variables

- Machine learning Algorithms: to classify fake news

Research Aim:

The research aim is to build a model to classify fake news on the basis of independent variables.

Research Design:

The research has used the following steps:

- Exploratory Data Analysis
- Text Cleaning
- Removing spaces, punctuations, special characters
- Tf-idf: to convert texts into vectors
- Building Machine learning Models
- Conclusion

Data Collection:

Secondary source of data is used.

Format of data is csv file.

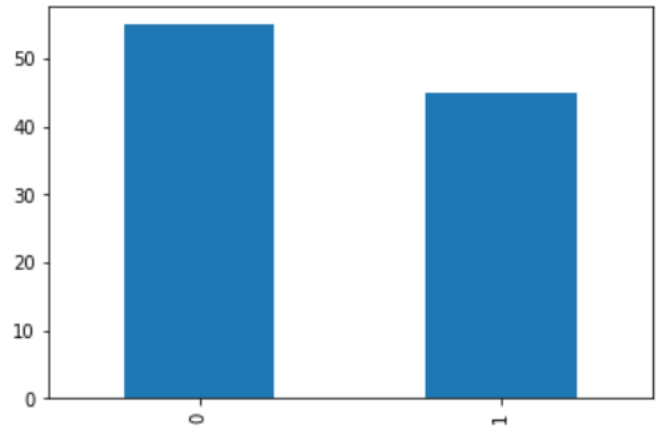
Data set contains 20800 rows and 7 features.

Data Preprocessing:

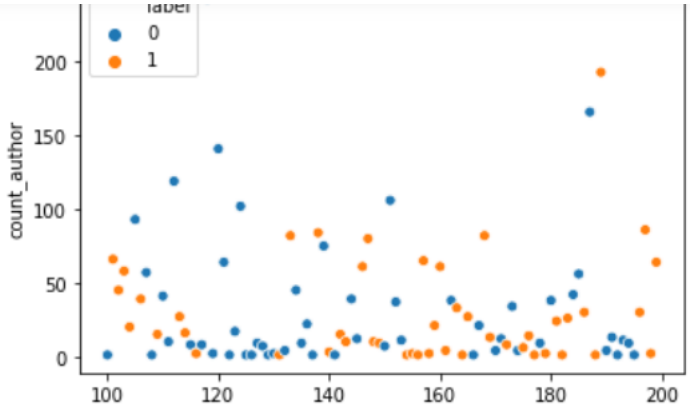
- Data type is checked.
- Data is balanced

```
(df.label.value_counts()/len(df['label'])*100).plot.bar()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x2263c360808>
```

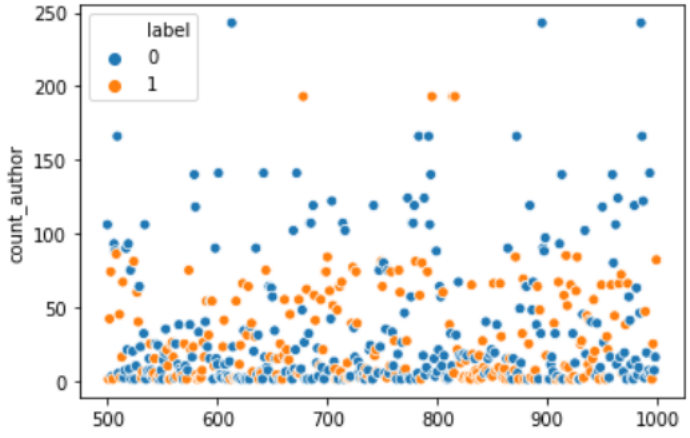


- checking any trend of frequency of author and fake news through scatter plot



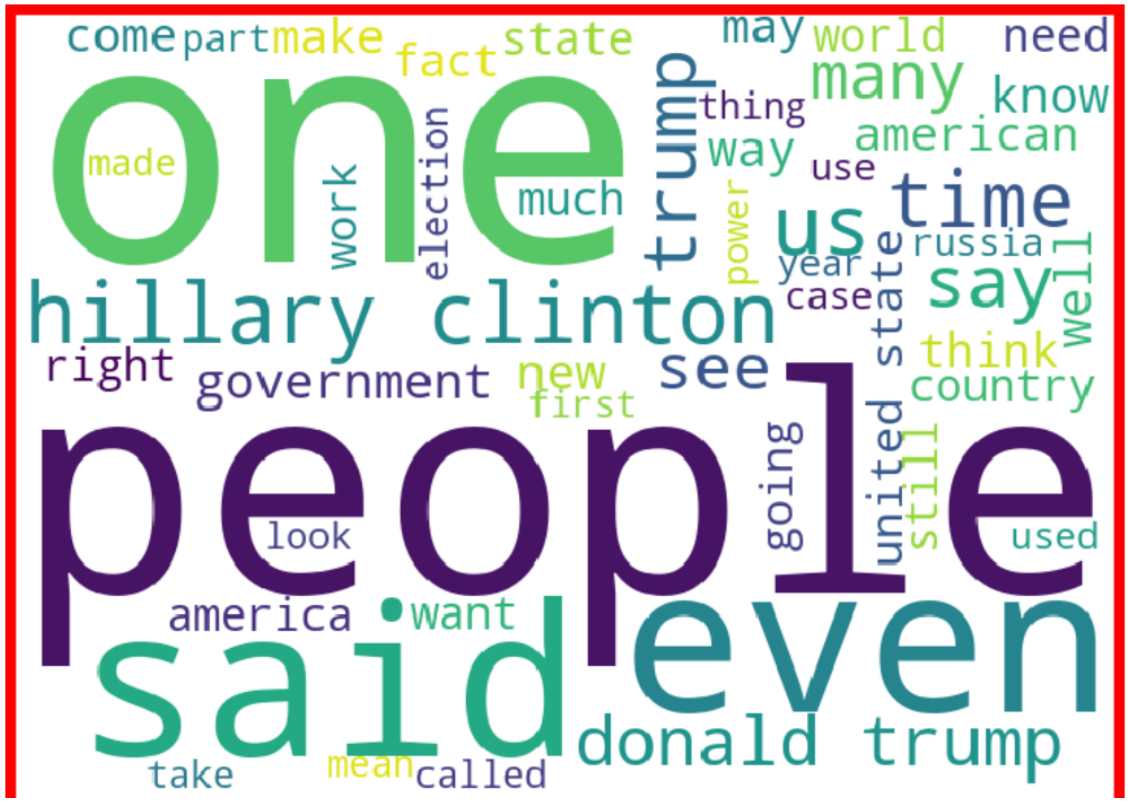

```
[94]: sns.scatterplot(x=df2.index,y=df2['count_author'][500:1000],hue=df2['labe
```

```
Out[94]: <matplotlib.axes._subplots.AxesSubplot at 0x2263b0f6dc8>
```



- Checking loud words in fake news

```
plt.show()
```



- We see words like people and said are high in frequency and weightage of fake news contents.

Model Deployment

After analyzing the problem statement, the best way to classify fake news into is to use classifications model with the help of Natural Language Processing because classification models take inputs, analyse them and give predicted result.

To evaluate our models we will use :

- Confusion matrix
- F1 score
- Recall
- Precision
- Accuracy

- **Precision:** Out of all positives, how many are actually positive.
- **Recall:** Out of all actual positives how many have been predicted as positive.
- **Accuracy:**

Following Models are used for this study:

MultinomialNB:

```
print(classification_report(y_test, y_pred))
```

```
              precision    recall  f1-score   support

           0       0.72      1.00      0.84      2617
           1       1.00      0.51      0.67      2094

    accuracy                           0.78      4711
   macro avg       0.86      0.75      0.75      4711
weighted avg       0.84      0.78      0.76      4711
```

Knn:

```
accuracy_score 0.5786457227764806
[[ 657 1960]
 [  25 2069]]
              precision    recall  f1-score   support

           0       0.96      0.25      0.40      2617
           1       0.51      0.99      0.68      2094

    accuracy                           0.58      4711
   macro avg       0.74      0.62      0.54      4711
weighted avg       0.76      0.58      0.52      4711
```

RandomForest:

```
0.8376140946720442
[[2538   79]
 [ 686 1408]]
              precision    recall  f1-score   support

           0       0.79      0.97      0.87      2617
           1       0.95      0.67      0.79      2094

    accuracy                           0.84      4711
   macro avg       0.87      0.82      0.83      4711
weighted avg       0.86      0.84      0.83      4711
```

DecisionTree:

```
accuracy_score 0.8957758437699003
[[2372  245]
 [ 246 1848]]
              precision    recall  f1-score   support

           0       0.91      0.91      0.91      2617
           1       0.88      0.88      0.88      2094

    accuracy                           0.90      4711
   macro avg       0.89      0.89      0.89      4711
weighted avg       0.90      0.90      0.90      4711
```

Model	**Test_score**
MultinomialNB	0.781150
Knn	0.578646
RandomForest	0.837614
DecisionTree	0.895776

Conclusion

- From the above study it is been observed that there is no such trend or relationship between frequency of authors and fake news.
- Also, it is been observed authors having no name, just having words like admin or no reply are sending fake news.
- Authors Pam Key is observed to be most authentic author as his frequency of sending news is the highest and more than 95% news are true.
- Decision Tree is the best performing model with accuracy score of 89%.
- Mostly news is related to politics.
- Subjects on Hilary Clinton and headline with Donald Trump are more prone to be a fake news.

In conclusion we can say that fake news is a major issue because it plays with people emotions disturbing a entire nation. Mostly when it comes to politics huge amount of fake news is spread, with the help of Machine Learning Algorithms we can minimize the spread. Also in this study Decision Tree model is the best performing model. This model can be used for detecting fake news.

References:

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