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FAKE NEWS CONTRARY TO SOCIAL MEDIA DEEP LEARNING & MACHINE LEARNING

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Abstract

Purpose:
The purpose of this research is to address the issue of fake news circulating on social media platforms, with a particular focus on Twitter. The aim is to develop a model that automates the detection of fabricated news messages in Twitter datasets by predicting accuracy ratings. The goal is to contribute to maintaining a robust online media and social networking environment.

Methodology:
To achieve the purpose, the researchers employ a methodology that involves learning how to anticipate precision evaluations of news messages. The dataset used for the analysis consists of tweets. Five popular machine learning techniques, namely Support Vector Machine (SVM), Naive Bayes Method, Logistic Regression, and Recurrent Neural Network models, are individually compared to assess their effectiveness in classifying fake news. The researchers utilize these techniques to train the model and evaluate its performance.

Findings:
The research findings indicate that both Support Vector Machine (SVM) and Naive Bayes classifier outperform the other machine learning techniques in detecting fake news on Twitter. The model developed using these techniques demonstrates superior classification performance on the dataset of tweets, suggesting their effectiveness in automated fake news detection. The findings validate the potential of machine learning algorithms in addressing the problem of fake news on social media platforms, specifically Twitter.

Recommendations:
Based on the findings, the researchers recommend the implementation of the Support Vector Machine (SVM) and Naive Bayes classifier algorithms for automated fake news detection on Twitter. These techniques have proven to be effective in identifying fabricated news messages. It is crucial for social media platforms to integrate such models into their systems to enhance the accuracy of news distribution and protect users from misinformation. Additionally, ongoing research and development efforts should continue to improve and refine these algorithms, considering the evolving nature of fake news and the need for robust detection methods.

Keywords: Naive Based Classifier, News, Prediction, Recommendation, Support Vector Machine (SVM), Fake News, Twitter, Social Media, Data quality, Counterfeit, Machine Learning, Deep learning

Introduction

In the era of digital misinformation, the detection of fake news has become a crucial challenge. As the spread of false information continues to threaten the credibility of news sources and impact public opinion, the development of smart systems for fake news detection has gained significant attention. Machine learning and deep learning techniques have emerged as powerful tools in this endeavor, offering the potential to effectively identify and combat fake news. This article introduces the concept of a smart system for fake news detection using machine learning and deep learning, highlighting their significance in addressing this pressing issue. (Post, Gollub. Komolossy. 2017) In Today's world, anybody can post the content over the internet. Unfortunately, counterfeit news gathers a lot of consideration over the web, particularly via web-based networking media. Individuals get misdirected and don't reconsider before flowing such mis-educational pieces to the most distant part of the arrangement. Such type of activities are not good for the society where some rumors or vague news evaporates the negative thought among the people or specific category of people.

As fast the technology is moving, on the same pace the preventive measures are required to deal with such activities. Broad communications assuming a gigantic job in impacting the general public and as it is normal, a few people attempt to exploit it. There are numerous sites which give false data. (M. Granik and V. Mesyura,) They deliberately attempt to bring out purposeful publicity, deceptions and falsehood under the pretense of being true news. Their basic role is to control the data that can cause open to have confidence in it. There are loads of case of such sites everywhere throughout the world .Therefore, counterfeit news influences the brains of the individuals. As indicated by study Scientist accept that numerous man-made brainpower calculations can help in uncovering the bogus news.

A thorough investigation of the current tweets shows that misleading news spreads more frequently through people than true news does. Lies spread faster around us, and more broadly than reality in all informational fields, and the results were more horrific and destructive. There are many different types of tweets, including those on political issues, global hot topics, mental health difficulties, urban legends, and natural disasters. What's more alarming is that, according to research, it's not simply bots that are disseminating the majority of the false information. A small group of persons committed a significant portion of this crime. They clarified that normal users are also included. In this instance, popular users and verified users were not more frequently at the centre of disseminating false information about the altered postings. Social media fake stories can spread quickly and widely may wreak great damage on our society and nation.

This has been a great motivator for us to work on this project. Fake news detection is made to stop the rumours that are being spread through the various platforms, whether it be social media or messaging platforms. This is done to stop spreading fake news which leads to activities like mob lynching. Because of the frequent reports of mob lynchings that end in murder, fake news detection aims to identify these reports as false and put a stop to the related actions, shielding society from these senseless acts of violence. (Post, Gollub. Komolossy. 2017) (S. B. Parikh, V. Patil, and P. K. Atrey,) The main goal is to identify bogus news, which is a straight onward solution to a traditional text classification issue. Building a model that can distinguish between "Real" and "Fake" news is necessary. This has negative effects on social networking sites like Facebook, Instagram, microblogging sites like Twitter, and instant messaging apps like

WhatsApp and Hike, where false information gains significant traction and spreads rapidly around the nation and the world. The suggested approach aids in determining the veracity of the news. If the news is false, a related news story is recommended to the user. Shown in fig 01.

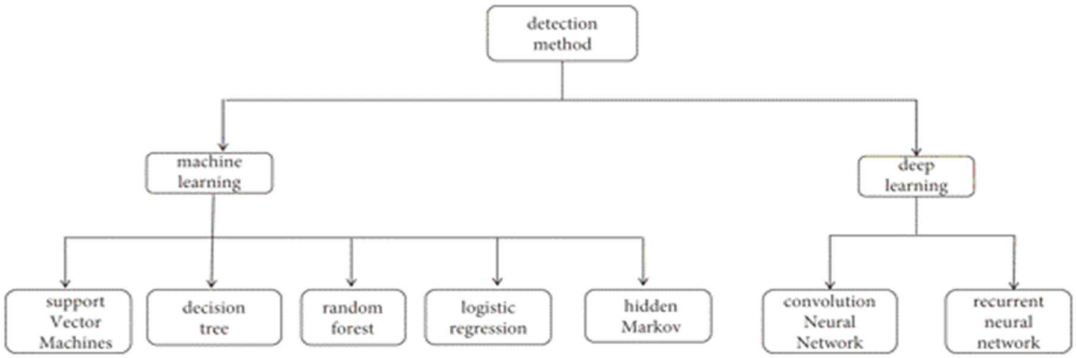

Fig 01: Directions according to the detection method

Deep learning and machine learning are powerful technologies that have revolutionized various fields, including social media. However, they can also be misused to spread fake news and misinformation. Here are some key properties of deep learning and machine learning in the context of fake news:

Data-driven approach: Deep learning and machine learning algorithms rely on large amounts of data to learn patterns and make predictions. This property can be both beneficial and detrimental when it comes to fake news. On the one hand, these algorithms can analyze vast amounts of information to detect patterns indicative of misinformation. On the other hand, they can also be trained on misleading or biased data, leading to the propagation of fake news.

Automation and scalability: Deep learning and machine learning models can process and analyze data at an incredible speed and scale. This property enables the rapid dissemination of information on social media platforms. While it can facilitate the detection of fake news through automated fact-checking systems, it can also contribute to the rapid spread of misinformation before it can be effectively addressed.

Natural language processing: Deep learning and machine learning techniques excel in understanding and processing human language. This property allows them to analyze text-based content, such as news articles, social media posts, and comments. By leveraging natural language processing, algorithms can identify linguistic patterns associated with fake news, such as sensationalist language, logical inconsistencies, or misleading claims.

Bias and interpretability: Deep learning models, particularly deep neural networks, can be highly complex and opaque. This lack of interpretability poses challenges when it comes to identifying and addressing biases within these models. If trained on biased data or influenced by biased sources, deep learning models can inadvertently perpetuate fake news and reinforce existing biases in social media algorithms.

Continuous learning: Deep learning and machine learning algorithms have the ability to continuously learn and adapt based on new data. While this property allows for model improvements and real-time updates to combat fake news, it also presents risks. If exposed to large amounts of false information, these algorithms can adapt and inadvertently incorporate fake news into their future predictions. To mitigate the spread of fake news, it is crucial to develop robust systems that combine deep learning and machine learning techniques with human oversight, ethical considerations, and critical thinking.

There have been quite a several initiatives taken to achieve fake news detection:
In 2018 three students of Vivekananda Education Society's Institute of Technology, Mumbai published their research paper on fake news detection. They wrote in their research paper, social media age has started in 20th century. Eventually the web usage is increasing, the posts are increasing, and the number of articles are increasing. They used various techniques and tool to detect fake news like NLP techniques, machine learning, and artificial intelligence. Facebook and WhatsApp are also working on fake news detection as they wrote in an article.

Several methods have been used to identify bogus news when it became widely circulated recently. Social bots, trolls, and cyborg users are the three main categories of fake news contributors. According to Social Bots, a social media account is considered a social bot if a computer algorithm is in charge of it. The social bot can create material on its own. Second, the trolls are actual people who "aim to disrupt online communities" in an effort to elicit an emotional reaction from social media users. Cyborg is a second. Users that combine "automated activities with human input" are known as cyborgs. Humans create accounts and employ software to carry out tasks on social media.

Facebook works to combat false information and misinformation
Facebook in an article quoted they are working to fight the spread of false news in two key areas. First is disrupting economic incentives because of most false news in financially motivated. Second one is Building new products to curb the spread of false news. Some of the preventive measures taken by Facebook are mentioned here:

- **Ranking Improvements**: News Feed ranks reduce the prevalence of false news content.
- **Easier Reporting**: Determine what is valuable and what is not. Stories that are flagged as false by our community than might show up lower in the user feed

WhatsApp Work for Fake News Detection
To stop the spread of misinformation, WhatsApp has implemented some security measures, also fake news detection, though these are under alpha phase, and are yet to be rolled out to the beta users. WhatsApp testing 'Suspicious Link Detection' feature: This feature will alert uses by putting a red label on links that it knows to lead to a fake or alternative website/news. Additionally, if a message has been forwarded from a device more than 25 times, the message could be blocked.

As mentioned in the above section, all top most giants are trying to hide their selves from the rumors and focus should be on true news and authenticated articles. More or less, the

approaches follow in the extraction are based on machine learning and Natural language processing. The classifiers, models and analytical algorithms are required to work hand in hand for the authentication of news articles. SVM will be used in the paper by the authors as an existing best suitable approach with Naïve Bayes. SVM is best suited for binary classification. There are various news websites and news blogs, which allows to work with RSS feeds and import the references of the news articles. This will helps us in finding the news accuracy.

Methodology

From the above discussion we already came to know that there are two classes in a news, whether it's real or fake one. To classify a news, we need to understand the problem definition first, then we go for our model and evaluate the result. Machine Learning is replete with its algorithms but some of them are really good for "Fact or Fiction" detection and some are on an average scale.

Our main focus was on the feature engineering that if we could tune-up the features or add some other features the accuracy of detecting news can be much efficient. From the idea of psychological research on false news, we find out the word lengths in a tweet statement can be a great feature as unauthenticated news content a lot of title, words and fictional statements. So, we added a new feature word length which is actually the count of words in a tweeted statement without any links, date or any indications.

Algorithms

In our model, we used 5 different types of machine learning algorithms and for the implementation work, we used Python 3.6.5 as our programmable language. The classification models that we implemented using the above- mentioned dataset are Bayesian Model, Logistic Regression & also Support Vector Machine - two most famous deep learning methods RNN Recurrent Neural Network and Long Short-Term Memory were also implemented to see how well our data fit into the model. These algorithms are good for different classifications and they got their own properties and performance based on different datasets. As we said earlier Naïve Bayes, Logistic Regression and SVM are more commonly used algorithms for classification problems.

Preparing

The Datasets To apply these algorithms, first, we need to process our dataset. We used Pandas, Numpy, Scikit-learn, keras library, and visualization, we use matplotlib. As we are dealing with text data, we will implement the following different ideas in order to process the dataset. Those are as follows

- Count Vectors
- TF-IDF
- Word Level
- N-gram Level
- Character Level
- Word Embedding

Count Vectors:
Count Vector represents a notation in the form of a matrix data set matrix notation in which corpus document is represented by each row, each column represents a corpus term, and each cell represents the frequency count of a particular term in a particular document.

TF-IDF:
TF-IDF represents how frequent a term is in an entire document. It tries to assign a metric value to represent the presence of that term. This is widely and frequently utilized in text mining. This weight is a factual measure used to assess how essential a word is to a report in a gathering or corpus.
Based on several types of input tokens like words, characters, n-grams, TF-IDF Vectors can be generated.

- Word Level TF-IDF: TF-IDF value of each term represented in a matrix format.
- N-gram Level TF-IDF: Combination of N termsis represented by N gram level. This matrix depicts TF-IDF N-gram scores
- Character Level TF-IDF: TF-IDF values of the ngrams character level in corpus represented in a matrix.

Word Embedding: A word embedding is a form of representation of words and documents with a dense representation of vectors. The text learns the where the word is located in the vector space and is based on the words used around the word.
There are four key steps:

- Embedding of the pretrained word
- Create an object tokenizer
- Transform text documents into tokens ' sequence and pad them
- Create a token mapping and its embedding

We split our dataset into 60% train data and 20% test data including 20% validation LSTM, RNN model and we use kfold cross validation for our other models where k = 2.

In the LSTM, as it is a part of the neural network, we used the embedding layer, hidden layer, an input layer and output layer finally. We used ‘Sigmoid’ activation, ‘glorot_normal’ kernel initializers, ‘categorical_crossentropy’ loss and ‘RMSprop’ as an optimizer.

In light of the ongoing issue of fake news on social media and the potential of deep learning and machine learning in addressing this problem,

Future Recommendations:
Continued research and development: It is crucial to invest in ongoing research and development efforts to enhance the capabilities of deep learning and machine learning algorithms in detecting and combating fake news. This includes exploring new techniques, refining existing models, and adapting to emerging trends and challenges in the realm of misinformation.

Collaboration between researchers and social media platforms: Collaboration between researchers, data scientists, and social media platforms is essential to leverage the expertise of both parties. By working together, they can develop more robust and effective algorithms for fake news detection, as well as implement these algorithms directly within social media platforms to mitigate the spread of misinformation.

Transparency and explainability: Enhancing the transparency and explainability of deep learning and machine learning models is crucial for building trust among users. Efforts should be made to develop methodologies that allow users to understand how these algorithms identify and classify fake news. This transparency will help users make informed judgments about the information they encounter on social media.

User education and media literacy: Promoting media literacy and educating users about the risks of fake news is vital in combating its spread. Social media platforms should invest in initiatives to educate users on how to identify and critically evaluate information, empowering them to discern between reliable and unreliable sources.

Integration of human oversight: While deep learning and machine learning models play a crucial role in automated fake news detection, human oversight remains essential. The integration of human reviewers and fact-checkers can provide valuable context, nuanced judgment, and critical thinking to further refine the accuracy of automated detection systems.

International cooperation and regulation: Fake news is a global issue that transcends borders. International cooperation and collaboration among governments, organizations, and social media platforms are necessary to establish regulations and guidelines that govern the dissemination of information online. These regulations can help deter the creation and spread of fake news while ensuring freedom of expression and protecting users' rights.

By considering these future recommendations, it is possible to leverage the power of deep learning and machine learning to mitigate the impact of fake news on social media, fostering a more reliable and trustworthy online information ecosystem.

Conclusion

In conclusion, the issue of fake news on social media platforms, particularly Twitter, has become a significant challenge. This research focused on developing a model using deep learning and machine learning techniques to detect fabricated news messages on Twitter and predict their accuracy. The study compared five popular machine learning techniques and found that Support Vector Machine (SVM) and Naive Bayes classifier outperformed the others in classifying fake news.

The findings demonstrate the potential of machine learning algorithms in effectively addressing the problem of fake news on social media platforms. The researchers recommend the implementation of SVM and Naive Bayes algorithms for automated fake news detection on

Twitter. Integrating these techniques into social media systems can enhance the accuracy of news distribution and protect users from misinformation.

It is crucial to continue research and development efforts to improve and refine these algorithms, considering the evolving nature of fake news. Collaboration between researchers and social media platforms is also necessary to leverage expertise and develop more robust algorithms. Additionally, efforts should focus on enhancing transparency and explainability of deep learning and machine learning models to build trust among users. Overall, the combination of deep learning, machine learning, and human oversight is essential in combating fake news and maintaining a reliable online media and social networking environment.

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