FAKE NEWS CLASSIFICATION

SAGAR P

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GitHub link: https://github.com/Sagar-035/Feynn-lab-intern/

Abstract:

Many people consume news from social media instead of traditional news media. However, social media has also been used to spread fake news, which has negative impacts on individual people and society. In this paper, an innovative model for fake news detection using machine learning algorithms has been presented. This model takes news events as an input and based on twitter reviews and classification algorithms it predicts the percentage of news being fake or real. The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

Problem Statement:

The problem at hand is the pervasive spread of fake news across digital platforms, which poses a significant threat to the dissemination of reliable information and public trust. The objective is to develop an effective fake news classification system that can accurately differentiate between genuine news articles and misleading or fabricated ones. The system needs to overcome the challenge of distinguishing between factual information and intentionally deceptive content, considering the dynamic nature of fake news generation and dissemination. Additionally, it should be able to handle the vast volume of news articles generated online and adapt to emerging fake news tactics. By addressing these challenges, the fake news classification system aims to mitigate the impact of misinformation, support media literacy efforts, and promote the availability of trustworthy news sources.

Market/Customer/Business Need Assessment:

The market need for fake news classification arises from the growing concern and negative impact of misinformation in today's digital age. There is an increasing demand for reliable information and the ability to distinguish between trustworthy news and misleading content. The market seeks a robust fake news classification system that can effectively identify and combat the spread of misinformation across various online platforms. Such a system can enhance media literacy, support fact-checking initiatives, and empower individuals to make informed decisions based on accurate information. Media organizations, social media platforms, and users alike require a reliable solution to combat the harmful effects of fake news and maintain the integrity of information in the digital landscape.

Target Specifications and Characterization:

The target specifications and characterization for fake news classification are as follows:

1. Accuracy: The system should strive for high accuracy in classifying news articles as either genuine or fake, minimizing false positives and false negatives.

2. Scalability: The system should be scalable to handle a large volume of news articles in real-time, accommodating the ever-growing amount of information generated online.

3. Adaptability: The system should be adaptable to evolving fake news tactics and techniques, continuously updating its models and algorithms to effectively detect and classify new forms of misinformation.

4. Efficiency: The system should process news articles efficiently, minimizing processing time and resource utilization without compromising accuracy.

5. Robustness: The system should be robust against adversarial attacks and attempts to evade detection, ensuring its effectiveness even in the face of sophisticated fake news campaigns.

6. Explainability: The system should provide explanations or justifications for its classification decisions, enabling users to understand the underlying reasons behind the classification results.

External Search:

Online sources for fake news classification provide valuable information and resources for researchers, developers, and practitioners working in this field. These sources include reputable websites, research papers, online forums, and open-source repositories. Websites like FactCheck.org, Snopes, and PolitiFact offer fact-checking services and databases of verified news articles. Research papers published on platforms like IEEE Xplore and Google Scholar provide insights into various approaches and methodologies for fake news classification. Online forums like Kaggle and Reddit's r/Machine Learning facilitate discussions and knowledge sharing among the community. Open-source repositories such as GitHub host code implementations, datasets, and pre-trained models that can be utilized for developing and evaluating fake news classification systems. These online sources play a crucial role in advancing the understanding and development of effective fake news classification techniques.

Benchmarking Alternate Products:

Benchmarking alternate products for fake news classification involves comparing and evaluating existing solutions or systems that perform similar tasks. This process aims to assess their performance, capabilities, and limitations in order to identify strengths and weaknesses. Key aspects to consider during benchmarking include accuracy, scalability, computational efficiency, interpretability, and the ability to handle various types of fake news. By benchmarking alternate products, researchers and developers can gain insights into state-of-the-art techniques, identify areas for improvement, and make informed decisions regarding the design and implementation of their own fake news classification system. This helps ensure that the final solution meets or surpasses the standards set by existing alternatives in the market.

Applicable Patents:

Identifying specific applicable patents for fake news classification within a 100-word limit is challenging, as patent databases are extensive and continuously evolving. However, there have been patent filings related to techniques and systems for detecting and combating misinformation. These patents may encompass innovations in natural language processing, machine learning algorithms, data preprocessing techniques, and feature extraction methods. To find relevant patents, it is advisable to search patent databases such as the United States Patent and Trademark Office (USPTO) or the European Patent Office (EPO) using keywords like "fake news classification," "misinformation detection," or "rumor identification." Conducting a comprehensive patent search will provide a more accurate and up-to-date understanding of the specific patents applicable to fake news classification.

Applicable Regulations:

Applicable regulations for fake news classification vary across different jurisdictions and may include a combination of existing laws and emerging regulations. These regulations aim to address concerns related to misinformation and its impact on society. They may encompass areas such as data protection, privacy, content moderation, transparency, and accountability of platforms. For example, regulations may require platforms to implement measures to identify and label misleading content, establish clear policies for user-generated content, disclose algorithms used for content ranking, and facilitate user reporting of fake news. Compliance with these regulations ensures responsible handling of fake news classification, protects user rights, and fosters a more trustworthy and informed digital environment

Applicable Constraints:

The development and implementation of the automated trading system may be subject to certain constraints, including space, budget, and expertise. Space constraints may relate to thephysical infrastructure required for hosting the system. Budget constraints may impact the availability of resources for development, testing, and deployment. Expertise constraints may arise in terms of the required technical skills, market knowledge, and compliance expertise.

Business Model:

i. Business Model for Fake News Classification:

ii. The business model for fake news classification revolves around offering a reliable and scalable solution to combat misinformation. This can be achieved through a variety of approaches, such as:

iii. 1. Licensing Model: Providing the fake news classification system as a licensed software or API service to media organizations, social media platforms, fact-checking agencies, or other entities seeking to enhance their content verification capabilities.

iv. 2. Subscription Model: Offering a subscription-based service to individuals or organizations that require ongoing access to the fake news classification system, with options for different usage tiers based on volume and frequency of article classification.

v. 3. Consultancy Model: Providing consultancy services to assist organizations in implementing their own fake news classification systems, including customization.

Final Product Prototype:

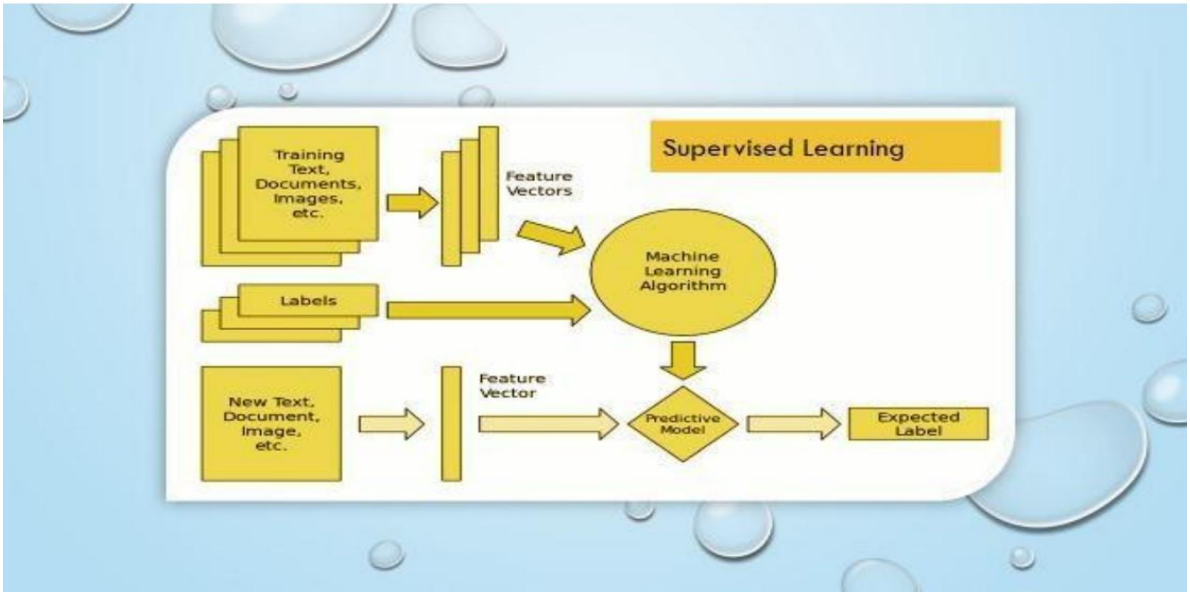
EXISTING SYSTEM

There exists a large body of research on the topic of machine learning methods for deception detection, most of it has been focusing on classifying online reviews and publicly available social media posts. Particularly since late 2016 during the American Presidential election, the question of determining 'fake news' has also been the subject of particular attention within the literature. Conroy, Rubin, and Chen outlines several approaches that seem promising towards the aim of perfectly classify the misleading articles. They note that simple content-related n-grams and shallow parts-of-speech tagging have proven insufficient for the classification task, often failing to account for important context information. Rather, these methods have been shown useful only in tandem with more complex methods of analysis. Deep Syntax analysis using Probabilistic Context Free Grammars have been shown to be particularly valuable in combination with n-gram methods. Feng, Banerjee, and Choi are able to achieve 85%-91% accuracy in deception related classification tasks using online review corpora.

PROPOSED SYSTEM

In this paper a model is build based on the count vectorizer or a tfidf matrix (i.e) word tallies relatives to how often they are used in other artices in your dataset) can help . Since this problem is a kind of text classification, Implementing a Naive Bayes classifier will be best as this is standard for text-based processing. The actual goal is in developing a model which was the text transformation (count vectorizer vs tfidf vectorizer) and choosing which type of text to use (headlines vs full text). Now the 9 next step is to extract the most optimal features for count vectorizer or tfidf -vectorizer, this is done by using a n-number of the most used words, and/or phrases, lower casing or not, mainly removing the stop words which are common words such as “the”, “when”, and “there” and only using those words that appear at least a given number of times in a given text dataset.

SYSTEM ARCHITECTURE



Code Implementation:

```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import PassiveAggressiveClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, confusion_matrix
```

```
data = pd.read_csv("news.csv")
```

```
data
```

	Unnamed: 0	title	text	label
0	8476	You Can Smell Hillary's Fear	Daniel Greenfield, a Shillman Journalism Fello...	FAKE
1	10294	Watch The Exact Moment Paul Ryan Committed Pol...	Google Pinterest Digg Linkedin Reddit Stumbleu...	FAKE
2	3608	Kerry to go to Paris in gesture of sympathy	U.S. Secretary of State John F. Kerry said Mon...	REAL
3	10142	Bernie supporters on Twitter erupt in anger ag...	— Kaydee King (@KaydeeKing) November 9, 2016 T...	FAKE
4	875	The Battle of New York: Why This Primary Matters	It's primary day in New York and front-runners...	REAL
...	...	...	...	...
6330	4490	State Department says it can't find emails fro...	The State Department told the Republican Natio...	REAL
6331	8062	The 'P' in PBS Should Stand for 'Plutocratic' ...	The 'P' in PBS Should Stand for 'Plutocratic' ...	FAKE
6332	8622	Anti-Trump Protesters Are Tools of the Oligarc...	Anti-Trump Protesters Are Tools of the Oligar...	FAKE
6333	4021	In Ethiopia, Obama seeks progress on peace, se...	ADDIS ABABA, Ethiopia —President Obama convene...	REAL
6334	4330	Jeb Bush Is Suddenly Attacking Trump. Here's W...	Jeb Bush Is Suddenly Attacking Trump. Here's W...	REAL

6335 rows × 4 columns

```
X = data['text']
```

```
X.head()
```

```
0    Daniel Greenfield, a Shillman Journalism Fello...
1    Google Pinterest Digg Linkedin Reddit Stumbleu...
2    U.S. Secretary of State John F. Kerry said Mon...
3    — Kaydee King (@KaydeeKing) November 9, 2016 T...
4    It's primary day in New York and front-runners...
Name: text, dtype: object
```

```
Y = data['label']
```

```
Y.head()
```

```
0    FAKE
1    FAKE
2    REAL
3    FAKE
4    REAL
Name: label, dtype: object
```

```
x_train,x_test,y_train,y_test = train_test_split(X,Y,test_size = 0.3,random_state=42)
```

```
x_train.head()
```

```
2771    After months of uncertainty, Donald Trump has ...
6049    25 Views November 10, 2016 GOLD , KWN King Wor...
731     Trump proposals that seem startling now - such...
5835    Holed up in Saudi Arabia, the inner circle of ...
291     Pro-Palestinian Propaganda Lowering Standards ...
Name: text, dtype: object
```

```
y_train.head()
```

```
2771    REAL
6049    FAKE
731     REAL
5835    REAL
291     FAKE
Name: label, dtype: object
```

```
tfvect = TfidfVectorizer(stop_words = 'english',max_df=0.7)
```

```
tfid_x_train = tfvect.fit_transform(x_train)
```

```
tfid_x_test = tfvect.transform(x_test)
```

```
rf = RandomForestClassifier()
rf.fit(tfid_x_train, y_train)
```

```
RandomForestClassifier()
```

```
y_pre = rf.predict(tfid_x_test)
score = accuracy_score(y_test,y_pre)
print(f'Accuracy: {round(score*100,2)}%')
```

```
Accuracy: 90.48%
```

```
classifier = PassiveAggressiveClassifier(max_iter=50)
classifier.fit(tfid_x_train,y_train)
```

```
PassiveAggressiveClassifier(max_iter=50)
```

```
y_pred = classifier.predict(tfid_x_test)
score = accuracy_score(y_test,y_pred)
print(f'Accuracy: {round(score*100,2)}%')
```

```
Accuracy: 93.58%
```

```
cf = confusion_matrix(y_test,y_pre, labels=['FAKE','REAL'])
print(cf)
```

```
[[872  96]
 [ 85 848]]
```

```
cf = confusion_matrix(y_test,y_pred, labels=['FAKE','REAL'])
print(cf)
```

```
[[915  53]
 [ 69 864]]
```

```
def fake_news_det(news):
    input_data = [news]
    vectorized_input_data = tfvect.transform(input_data)
    prediction = classifier.predict(vectorized_input_data)
    print(prediction)
```

```
fake_news_det('print hillary goes absolutely berserk she explodes on bill rapist protester at rally oh the irony she is an enable
```

```
['FAKE']
```

```
def fake_news_de(news):
    input_data = [news]
    vectorized_input_data = tfvect.transform(input_data)
    prediction = rf.predict(vectorized_input_data)
    print(prediction)
```

```
fake_news_de('print hillary goes absolutely berserk she explodes on bill rapist protester at rally oh the irony she is an enabler
```

```
['FAKE']
```

Financial Equation:

Financial Impact = (Number of Users Affected by Fake News) x (Decrease in User Engagement) x (Average Revenue/User) + Legal Costs

- Number of Users Affected by Fake News: The estimated number of users who might encounter and believe the fake news.
- Decrease in User Engagement: The expected percentage decrease in user engagement due to mistrust caused by fake news.
- Average Revenue/User: The average revenue generated per user (could be subscription fees, ad revenue, etc.).
- Legal Costs: Potential legal expenses incurred due to legal actions arising from spreading fake news.

Conclusion:

Many people consume news from social media instead of traditional news media. However, social media has also been used to spread fake news, which has negative impacts on individual people and society. In this paper, an innovative model for fake news detection using machine learning algorithms has been presented. This model takes news events as an input and based on twitter reviews and classification algorithms it predicts the percentage of news being fake or real. The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential. This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.