

Fake news Detection Using Naive Bayes Classifier

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Abstract

Fake news has been on the rise thanks to rapid digitalization across all platforms and mediums. Many governments throughout the world are attempting to address this issue. The use of Natural Language Processing and Machine Learning techniques to properly identify fake news is the subject of this research. The data is cleaned, and feature extraction is performed using pre-processing techniques. Then, employing four distinct strategies, a false news detection model is created. Finally, the research examines and contrasts the accuracy of Naive Bayes, Support Vector Machine (SVM), neural network, and long short-term memory (LSTM) methodologies in order to determine which is the most accurate. To clean the data and conduct feature extraction, pre-processing technologies are needed. Then, employing four distinct strategies, a false news detection model is created. Finally, in order to determine the best fit for the model, the research explores and analyzes the accuracy of Naive Bayes, Support Vector Machine (SVM), neural network, and long short-term memory (LSTM) approaches. The proposed model is working well with an accuracy of products up to 93.6%.

Keywords

Artificial Intelligence, Fuzzy Logic, Fuzzy Inference, Machine Learning, Naive Based Classifier, Prediction, Recommendation, Support Vector Machine

1. Introduction

As we already know, in today's fast-paced world, the Internet plays a vital role in improving people's opinions. Everyone in the world uses social sites to stay connected with their friends; In the early days, these sites acted as a medium among people who wanted to keep in touch with their acquaintances, relatives, friends, etc. However, these sites have become a source of the spread of fake news, resulting in misleading and misleading individuals. This fake news fuels negative thoughts among people, resulting in various criminal activities like mob lynching.

The spread of fake information through the Internet is increasing at a tremendous rate; This created a strong need for preventive measures to prevent people from being misled or going in the wrong direction. We decided to build a machine learning control model on counterfeit action to prevent rumors from spreading through social media or other messaging-related platforms like WhatsApp. It works to detect and prevent the spread of false information, thus protecting society from unwanted acts of violence.[1]

This paper demonstrates the model for detecting fake news; Its primary purpose is to see fake news, a classic text classification problem. This machine learning model tries to differentiate between real and fake news, which gets a massive boost from social media sites or messaging applications like WhatsApp, Hike, Telegram, and viral among people. With the help of machine learning and natural language processing, we attempted to aggregate the news and subsequently determine the new information that led to most false news statements. Easier reporting: Stories reported by your friends as false are less visible in the user's feed.

2. WhatsApp Work for Fake News Detection

To prevent the spread of fake news, WhatsApp has implemented some security measures.

2.1 Libraries Used

NLTK: NLTK is used to build Python programs that work with human language data. NLTK has various text processing libraries like parsing, semantic reasoning, etc.

Word cloud: A word cloud is a pictorial representation of large text data in which each word of text has a different size which depends on the frequency of occurrence of that word in the text. Word cloud is the library that provides the functionality to create a word cloud for large text documents.

Seaborn: This library provides functionality to visualize the data.

Genism: It is an extensive basic stand for generating similar; it is an open-source NLP library used for unsupervised topic modeling

2.2 Dataset Used

Downloaded the dataset from kaggle.com, "fake.csv," which contains two csv (Excel file) files, fake.csv and true.csv. Imported this dataset into our model and then concatenated these two .csv files into one to split the entire dataset by selecting random rows in two parts. In one aspect, we trained our model, and in the latter part, we tested the accuracy of our model.

3. Methodologies

3.1 Approach

Fake news is multifaceted, and it's not easy to spot the category of information. Practical technology must have some perspectives to handle the issue properly. That is why the proposed strategy is a mix of Naïve Bayes classifier, Support Vector Machines, and semantic investigation. The proposed method has wholly made from AI draws near, which is essential to precise order between the genuine or the fake, rather than utilizing calculations that cannot mirror subjective capacities. The three-section strategy is a blend between Machine Learning calculations subdivided into managed learning procedures and characteristic language preparing techniques.



3.1.1 Naive Bayes

This is a supervised Machine Learning algorithm Naive Bayes; We use Bayes theorem. The variables used to generate the model are independent of each other. It has already been proven that it provides pretty good results [9][10].

$$P(X|C_i) = \prod_{k=1}^n P(x_k|C_i) = P(x_1|C_i) \times P(x_2|C_i) \times \dots \times P(x_n|C_i)$$

The classification was conducted by deriving the maximum posterior, the maximal $P(C_i|X)$, with the above assumption applying to the Bayes theorem. This assumption significantly reduces the computational cost by only counting the class distribution. Naive Bayes is one of the popular algorithms used to find the news's accuracy, whether it's real or fake, using multinomial Naive Bayes. Several algorithms focus on a common principle, so it is not the only algorithm for training such classifiers. To check if the news is fake or real, Naive Bayes can be used.

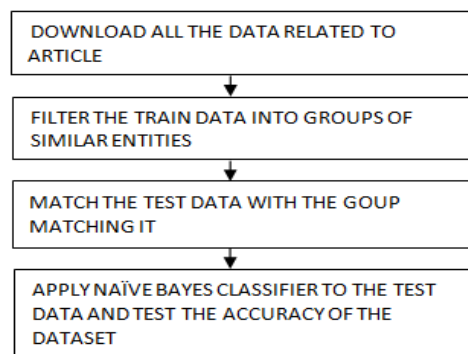


Figure 1(a). Depiction Naive Bayes can be used

3.1.2 Support Vector Machine (SVM)

SVM is an excellent algorithm for extracting binary classes based on the data given to the model. The task is to classify the articles in the proposed model into two categories: true or false.

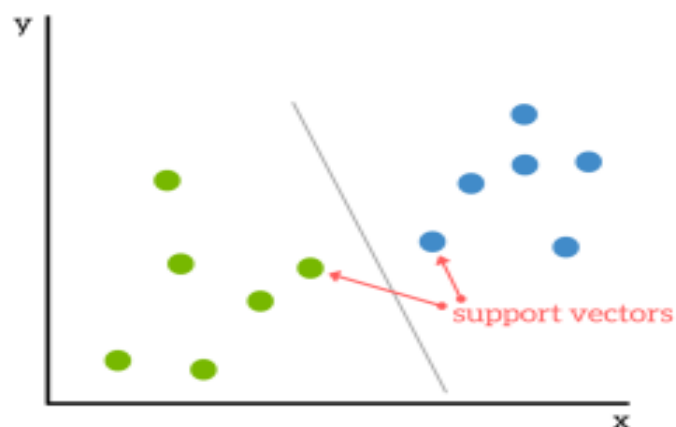


Figure 1(b). Depiction of hyper-plane dividing the dataset into two classes

The SVM strategy will be exceptionally advantageous in general because it is accurate and performs incredibly well on semi-structured datasets. Furthermore, this method is adaptable as it is also used to organize numbers or make decisions. Similarly, support vector machines can deal with high dimensional spaces and are memory-efficient in general [18].

3.3 Natural Language Processing

Natural language processing (NLP) refers to AI, interacting with an intelligent system using natural language such as English. Natural language processing is needed when you want an intelligent system such as a robot to perform according to your instructions when you want to hear a decision from a dialogue-based clinical expert system,

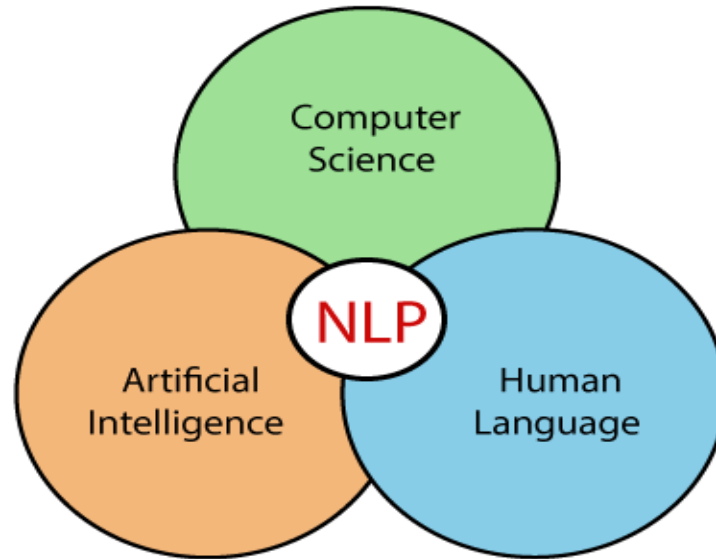


Figure 2. Natural language processing (NLP)

The field of NLP includes making computers perform practical tasks with the use of human languages. The input and output of an NLP system can be Speech or Written text.

Components There are two components of NLP as given:

Natural Language Understanding (NLU)

The comprehension includes the following tasks -

- Mapping a given input in natural language into useful representations.
- Analysis of different aspects of language.

Natural language construction (NLG) It is the process of constructing meaningful phrases and sentences in the form of natural language from some internal representation.

It involves –

- **Text Planning** – This involves retrieving relevant material from a knowledge base.
- **Sentence planning** - involves selecting the necessary words, creating meaningful phrases, setting the tone of Sentence.
- **Text realization** - this is mapping the sentence scheme to the sentence structure

4. SYSTEM ARCHITECTURE

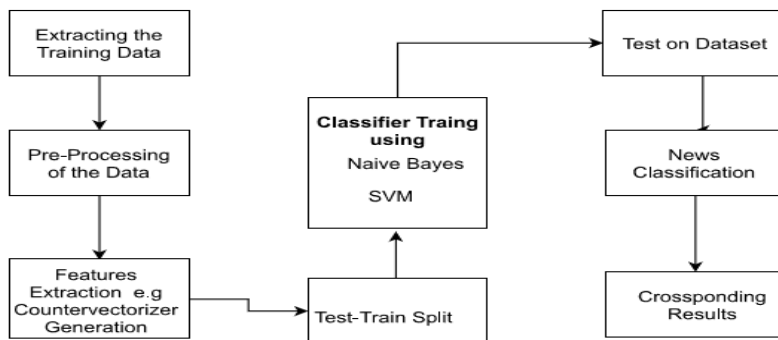


Figure 3. Flow Chart: Classifier Training

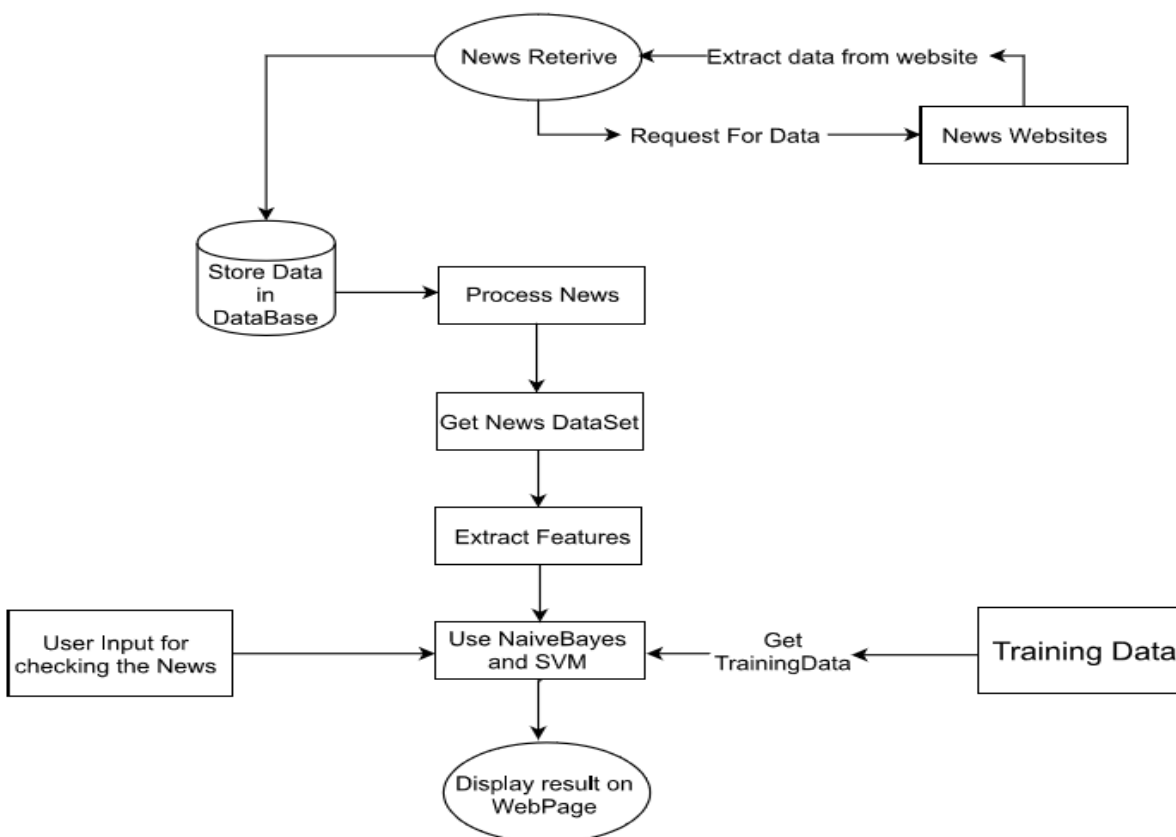


Figure 4. Flow chart – Proposed Model



5. Result

For implementation, four existing approaches are considered. The results of the mentioned four models are compared with the proposed model, it is found to have accuracy in the top 200 results. The demonstration is done using Python programming on VS Code and some machine learning algorithms.

6. Conclusion

It is essential to ascertain the accuracy of the news available on the internet through various articles. The components for identifying fake news are discussed in the paper. One thing to note is that not all fake news will be propagated through web-based networking media. Currently, the Naïve Bayes classifier is used to test the proposed method of SVM and NLP. An upcoming algorithm may provide better results with a hybrid approach serving the same purpose. The mentioned system detects fake news based on the model implemented. Also, it has provided some suggested information on this topic which is very useful for any user. In the future, the efficiency and accuracy of the prototype can be increased to a certain level, and the user interface of the proposed model can also be enhanced.

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