Detection of Fake Online Reviews Using Semi Supervised and Supervised Learning

Dhulepalla Vimala , Gatla Srinivasa Reddy, Kolla Vishnu Charan, Akkidasu Bapsi

Under The Esteemed Guidance Mrs. Sk. Shammi

Bachelor Of Technology
Department Of Computer Science And Engineering
Tirumala Engineering College
Jonnalagadda, Narasaraopet-522601, Palnadu (Dist.) A.P

ABSTRACT

Consumers reviews on ecommerce websites, online services, ratings and experience stories are useful for the user as well as the vendor. The reviewer can increase their brand's loyalty and help other customers understand their experience with the product. Similarly reviews help the vendors gain more profiles by increasing their sale of products, if consumers leave positive feedback on their product review. But unfortunately, these review mechanisms can be misused by vendors.

For example, one may create fake positive reviews to promote brand's reputation or try to demote competitor's products by leaving fake negative reviews on their product. Existing solutions with supervised include application of different machine learning algorithms and different tools like Weka.

Unlike the existing work, instead of using a constrained dataset I chose to have a wide variety of vocabulary to work on such as different subjects of datasets combined as one big data set. Sentiment analysis has been incorporated based on emojis and text content in the reviews. Fake reviews are detected and categorized. The testing results are obtained through the application of Naïve Bayes, Linear SVC, Support Vector Machine and Random forest algorithms. The implemented (proposed) solution is to classify these reviews into fake or genuine. The highest accuracy is obtained by using Naïve Bayes by including sentiment classifier.

1. INTRODUCTION

1.1 Introduction to project

Everyone can freely express his/her views and opinions anonymously and without the fear of consequences. Social media and online posting have made it even easier to post confidently and openly. These opinions have both pros and cons while providing the right feedback to reach the right person which can help fix the issue and sometimes a con when these get manipulated These opinions are regarded as valuable. This allows people with malicious intentions to easily make the system to give people the impression of genuineness and post opinions to promote their own product or to discredit the competitor products and services, without revealing identity of themselves or the organization they work for. Such people are called opinion spammers and these activities can be termed as opinion spamming.

There are few different types of opinion spamming. One type is giving positive opinions to some products with intention to promote giving untrue or negative reviews to products to damage their reputation. Second type consists of advertisements with no opinions on product. There is lot of research work done in field of sentiment analysis and created models while using different sentiment analysis on data from various sources, but the primary focus is on the algorithms and not on actual fake review detection. One of many other research works by E. I. Elmurngi and A. Gherbi used machine learning algorithms to classify the product reviews on Amazon.com dataset [2] including customer usage of the product and buying experiences. The use of Opinion Mining, a type of language processing to track the emotion and thought process of the people or users about a product which can in turn help research work.

One of the biggest applications of opinion mining is in the online and ecommerce reviews of consumer products, feedback and services. As these opinions are so helpful for both the user as well as the seller the e-commerce web sites suggest their customers to leave a feedback and review about their product or service they purchased. These reviews provide valuable information that is used by potential customers to know the opinions of previous or current users before they decide to purchase that product from that seller. Similarly, the seller or service providers use this information to identify any defects or problems users face with their products and to understand the competitive information to know the difference about their similar competitors' product

Individual consumers: A consumer can also compare the summaries with competing products before taking a decision without missing out on any other better products available in the market.

Business/Sellers: Opinion mining helps the sellers to reach their audience and understand their perception about the product as well as the competitors. Such reviews also help the sellers to understand the issues or defects so that they can improve later versions of their product. In today's generation this way of encouraging the consumers to write a review about a product has become a good strategy for marketing their product through real audience's voice. Such precious information has been spammed and manipulated. Out of many researches one fascinating research was done to identify the deceptive opinion spam.

2. LITERATURE SURVEY

Mohawesh et. al [3] presented an extensive survey of the most notable works to date on machine learning-based fake review detection. Firstly, they have reviewed the feature extraction approaches used by many researchers. Then, they detailed the existing datasets with their construction methods. Then, they outlined some traditional machine learning models and neural network models applied for fake review detection with summary tables.

Traditional statistical machine learning enhances text classification model performance by improving the feature extraction and classifier design. In contrast, deep learning improves performance by enhancing the presentation learning method, algorithm's structure and additional knowledge. They also provided a comparative analysis of some neural network model-based deep learning and transformers that have not been used in fake review detection. The outcomes showed that RoBERTa achieved the highest accuracy on both datasets. Further, recall, precision, and F1 score proved the efficacy of using RoBERTa in detecting fake reviews. Finally, they summarised the current gaps in this research area and the possible future direction to get robust outcomes in this domain.

Ahmed et. al [4] proposed a fake news detection model that use n-gram analysis and machine learning techniques. They investigate and compare two different features extraction techniques and six different machine classification techniques. Experimental evaluation yields the best performance using Term Frequency-Inverted Document
Frequency (TF-IDF) as feature extraction technique, and Linear Support Vector Machine (LSVM) as a classifier, with an accuracy of 92%.

Atefeh Heydari et. al [5] proposed a robust review spam detection system. A detailed literature survey has shown potential of the timing element when applied to this domain and lead to the development of review spam

detection approach based on time series analysis methods. Based on the consideration that the capture of burst patterns in reviewing process can improve the detection accuracy, in this experiment, they propose a review spam detection approach which investigates bogusness of reviews fallen.

Paul et. al [6] reviews the literature on Fake Review Detection (FRD) on online platforms. It covers both basic research and commercial solutions, and discusses the reasons behind the limited level of success that the current approaches and regulations have had in preventing damage due to deceptive reviews.

Deng et. al [7] analyzed all the characteristics of fake reviews of hype and find that the text of the review always tells us the truth. For the reason that hype review is always absolute positive or negative, they proposed an algorithm to detect online fake reviews of hype about restaurants based on sentiment analysis. In our experiment, reviews are considered in four dimensions: taste, environment, service and overall attitude. If the analysis result of the four dimensions is consistent, the review will be categorized as a hype review. Our experiment results have shown that the accuracy of our algorithm is about 74% and the method proposed in this article can also be applied to other areas, such as sentiment analysis of online opinion in emergency management of emergency cases.

Rathore et. al [8] propose a top-down framework for candidate fake reviewer groups' detection based on the DeepWalk approach on reviewers' graph data and a (modified) semi supervised clustering method, which can incorporate partial background knowledge. They validate our proposed framework on a real review dataset from the Google Play Store, which has partial ground-truth information about 2207 fraud reviewer-ids out of all 38 123 reviewer-ids in the dataset. Our experimental results demonstrate that the proposed approach is able to identify the candidate spammer groups with reasonable accuracy. The proposed approach can also be extended to detect groups of opinion spammers in social media (e.g. fake comments or fake postings) with temporal

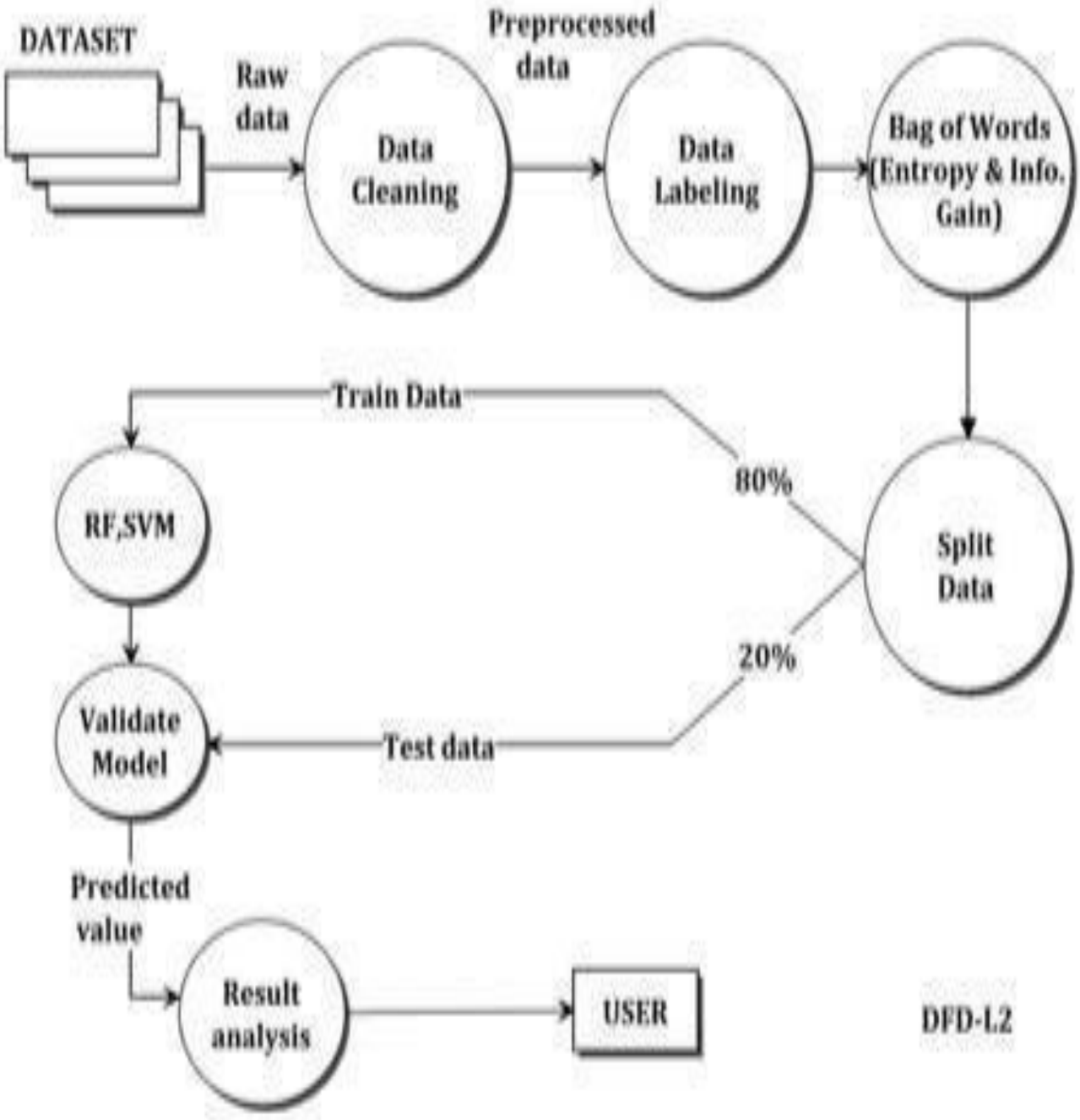
3. SYSTEM ANALYSIS AND DESIGN

3.1 Existing System

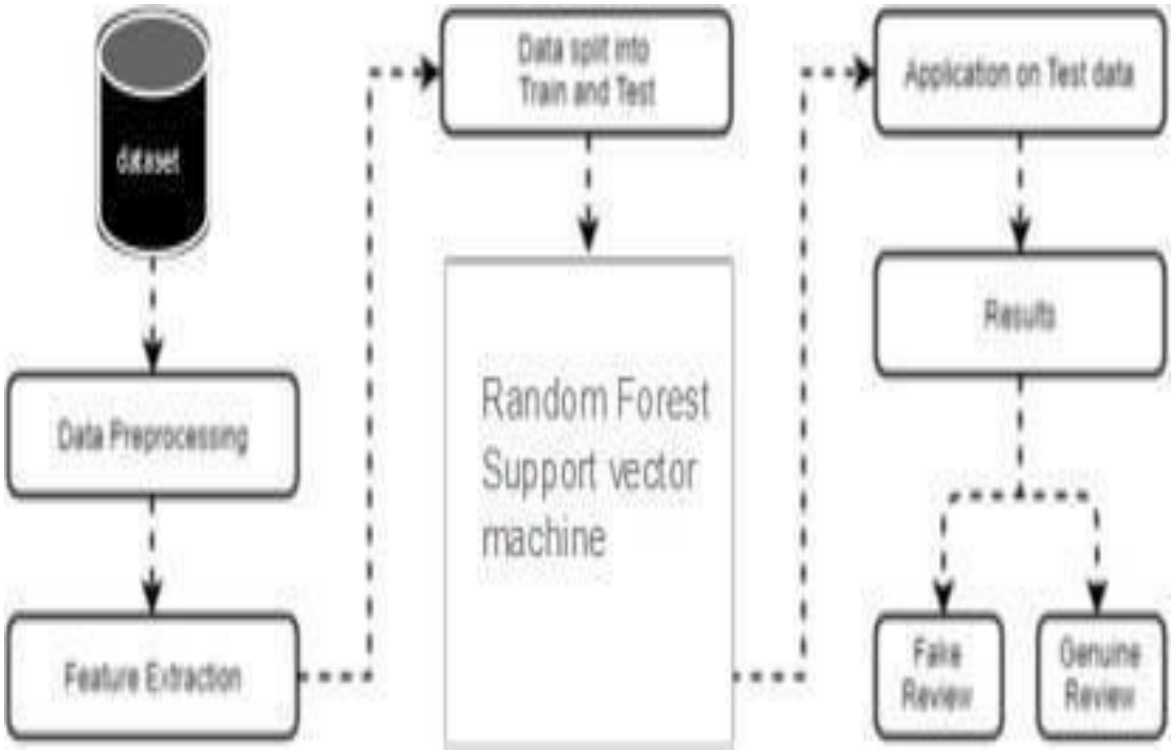
After finding and understanding various distinct methods used for fake review detection, we determined the importance of each method. Each method can perform well on its own and produce best results. Based on the previous studies mentioned above, we find that even though various fake review detection methods have been proposed, and some of them have proven to be effective, there still exist some problems. However, considering the lack of large scale datasets, deep learning methods might not be effective. Based on all the previous systems, we can see how the everevolving technology has yet again produced a smart way to conduct reviews. The introduction of Supervised and Semi-Supervised learning which are the techniques of Machine Learning has provided us with a new perspective on ways to conduct fake online reviews.

Disadvantages

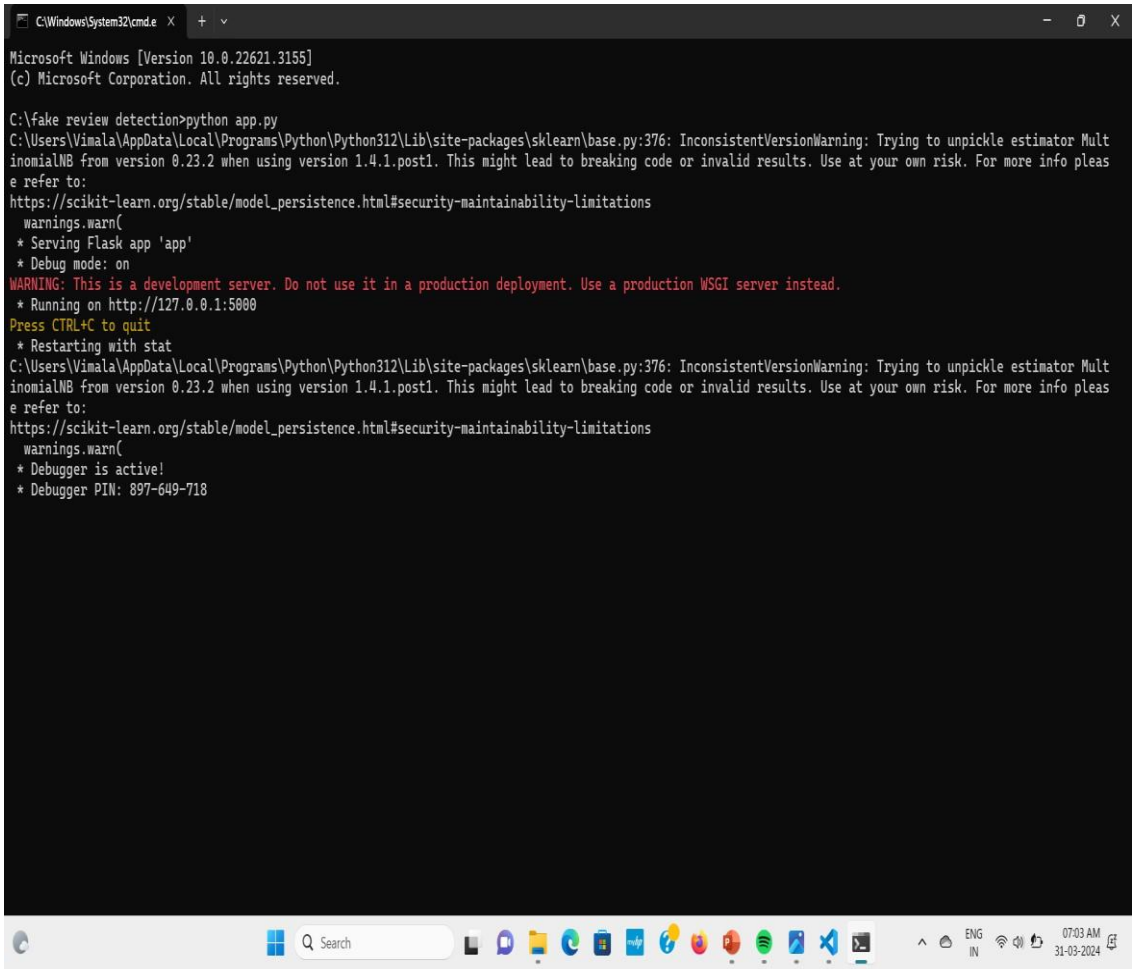
- In the existing work, the system uses only semi-supervised learning.
- Only Text classification as sentiment text and never finds fake.



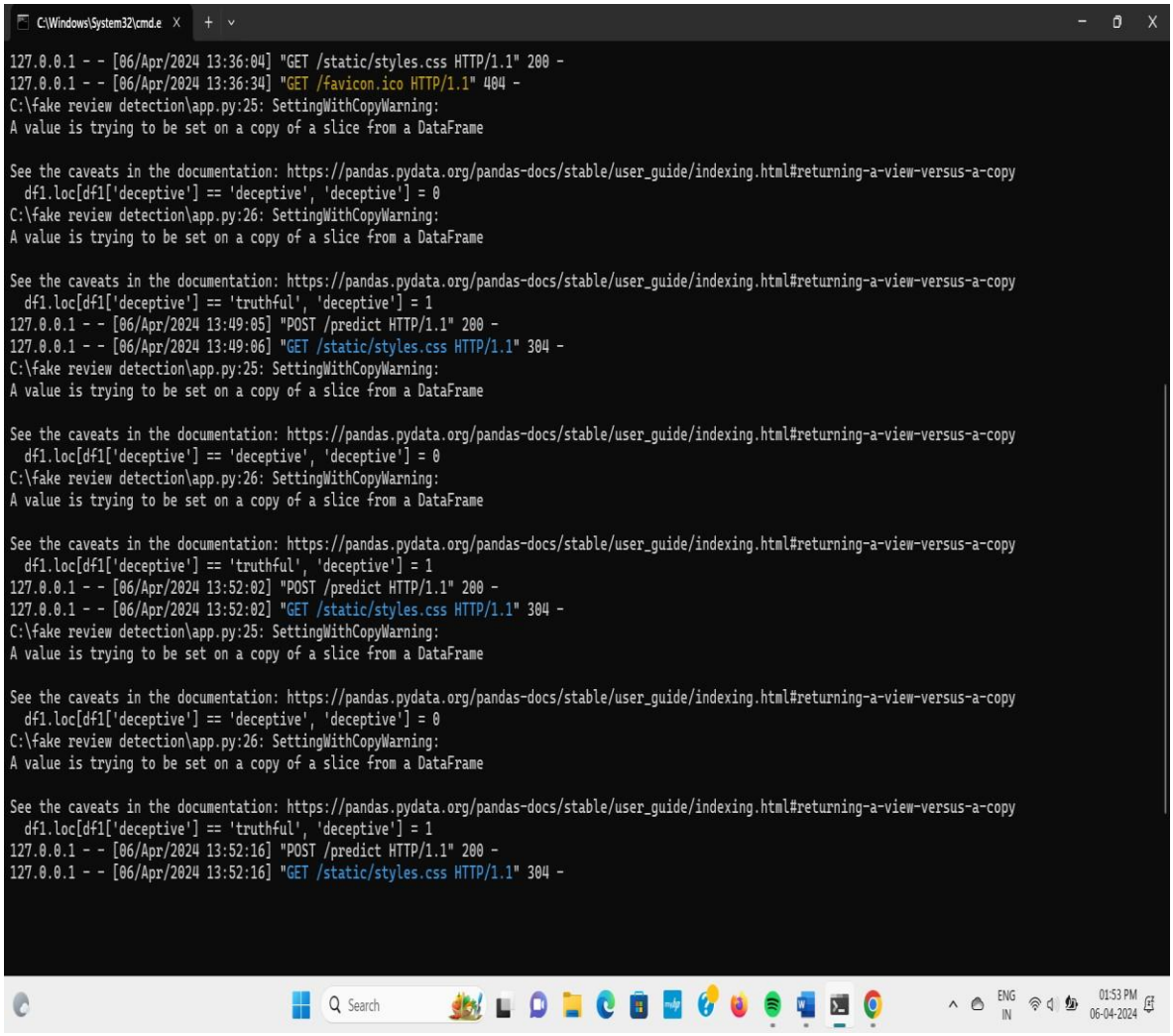
SYSTEM ARCHITECTURE



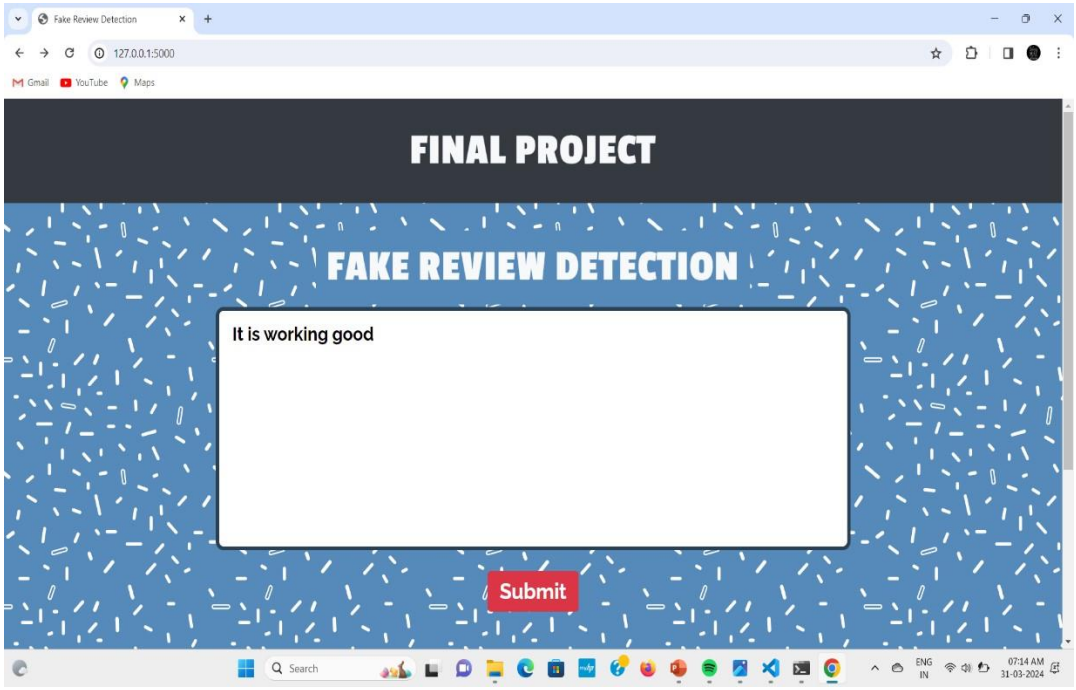
IMPLEMENTATION ARCHITECTURE


C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22621.3155]
(c) Microsoft Corporation. All rights reserved.
C:\fake review detection>python app.py
C:\Users\Vimala\AppData\Local\Programs\Python\Python312\Lib\site-packages\sklearn\base.py:376: InconsistentVersionWarning: Trying to unpickle estimator MultinomialNB from version 0.23.2 when using version 1.4.1.post1. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
* Serving Flask app 'app'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
C:\Users\Vimala\AppData\Local\Programs\Python\Python312\Lib\site-packages\sklearn\base.py:376: InconsistentVersionWarning: Trying to unpickle estimator MultinomialNB from version 0.23.2 when using version 1.4.1.post1. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:
https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations
warnings.warn(
* Debugger is active!
* Debugger PIN: 897-649-718
Search
ENG
IN
07:03 AM
31-03-2024

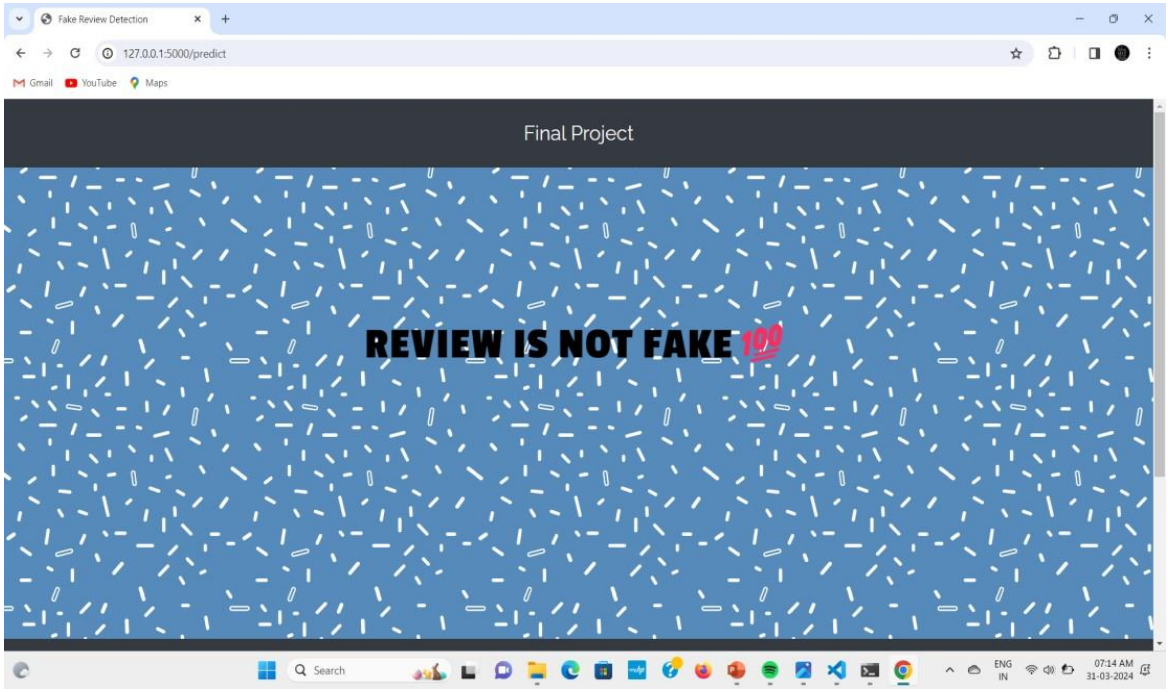
RUNNING PROMPT



Input-1



Output-1



SYSTEM TESTING

5.1 Test Objective

Testing is the process where the test data is prepared and is used for testing the modules individually and later the validation given for the fields. Then the system testing takes place which makes sure that all components of the system property functions as a unit. The test data should be chosen such that it passed through all possible condition. Actually testing is the state of implementation which aimed at ensuring that the system works accurately and efficiently before the actual operation commence. The following is the description of the testing strategies, which were carried out during the testing period.

System Testing

Testing has become an integral part of any system or project especially in the field of information technology. The importance of testing is a method of justifying, if one is ready to move further, be it to be check if one is capable to with stand the rigors of a particular situation cannot be underplayed and that is why testing before development is so critical. When the software is developed before it is given to user to user the software must be tested whether it is solving the purpose for which it is developed. This testing involves various types through which one can ensure the software is reliable. The program was tested logically and pattern of execution of the program for a set of data are

CONCLUSION

The fake review detection is designed for filtering the fake reviews. In this research work SVM classification provided a better accuracy of classifying than the Naïve Bayes classifier for testing dataset. On the other hand, the Naïve Bayes classifier has performed better than other algorithms on the training data. Revealing that it can generalize better and predict the fake reviews efficiently. This method can be applied over other sampled instances of the dataset. The data visualization helped in exploring the dataset and the features identified contributed to the accuracy of the classification. The various algorithms used, and their accuracies show how each of them have performed based on their accuracy factors.

Also, the approach provides the user with a functionality to recommend the most truthful reviews to enable the purchaser to make decisions about the product. Various

BIBLIOGRAPHY

1. E. I. Elmurngi and A. Gherbi, "Unfair Reviews Detection on Amazon Reviews using Sentiment Analysis with Supervised Learning Techniques," Journal of Computer Science, vol. 14, no. 5, pp. 714–726, June 2018.

2. J. Leskovec, "WebData Amazon reviews," [Online]. Available: http://snap.stanford.edu/data/web-Amazon-links.html [Accessed: October 2018].

3. J. Li, M. Ott, C. Cardie and E. Hovy, "Towards a General Rule for Identifying Deceptive Opinion Spam," in Proceedings of the 52nd Annual Meeting of the Association for Computational Linguistics, Baltimore, MD, USA, vol. 1, no. 11, pp. 1566-1576, November 2014.

4. N. O'Brien, "Machine Learning for Detection of Fake News," [Online]. Available: https://dspace.mit.edu/bitstream/handle/1721.1/119727/1078649610-MIT.pdf [Accessed: November 2018].

5. J. C. S. Reis, A. Correia, F. Murai, A. Veloso, and F. Benevenuto, "Supervised Learning for Fake News Detection," IEEE Intelligent Systems, vol. 34, no. 2, pp. 76-81, May 2019

6. B. Wagh, J. V. Shinde and P. A. Kale, "A Twitter Sentiment Analysis Using NLTK and Machine Learning Techniques," International Journal of Emerging Research in Management and Technology, vol. 6, no. 12, pp. 37-44, December 2017.

7. A. McCallum and K. Nigam, "A Comparison of Event Models for Naive Bayes Text Classification," in Proceedings of AAAI-98 Workshop on Learning for Text Categorization, Pittsburgh, PA, USA, vol. 752, no. 1, pp. 41-48, July 1998.

8. B. Liu and M. Hu, "Opinion Mining, Sentiment Analysis and Opinion Spam Detection," [Online]. Available: https://www.cs.uic.edu/~liub/FBS/sentimentanalysis.html#lexicon [Accessed: January 2019].

9. C. Hill, "10 Secretsto Uncovering which Online Reviews are Fake," [Online]. Available: https://www.marketwatch.com/story/10-secrets-to-uncovering-which-onlinereviewsare-fake- 2018-09-21 [Accessed: March 2019].

10. J. Novak, "List archive Emojis," [Online]. Available: https://li.st/jesseno/positivenegative-and-neutral-emojis6EGfnd2QhBsa3t6Gp0FRP9 [Accessed: June 2019]. 71