Fake Review Detection using Machine Learning

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Abstract

Online reviews have become increasingly important in the world of e-commerce, serving as a powerful tool to establish a business's reputation and attract new customers. However, the rise of fake reviews has become a growing concern as they can skew the reputation of a business and deceive potential customers. As a result, detecting fake reviews has become a key area of research in recent years.

This project proposes a machine learning-based approach to detect fake reviews. The method utilizes various feature engineering techniques to extract different behavioural characteristics of reviewers, such as the length of reviews and the frequency of review submissions. These characteristics are then used to train different algorithms, including K-Nearest Neighbors (KNN), Random Forest, and Support Vector Machine (SVM), to classify reviews as either genuine or fake. The proposed technique was evaluated using a real dataset extracted from the internet, and the results showed that SVM outperformed the other classifiers in terms of accuracy. This suggests that SVM is a powerful algorithm for distinguishing between genuine and fake reviews. However, the study also suggests that there is potential to improve the performance of the model by integrating more behavioural characteristics of reviewers, such as how frequently they do reviews and how long it takes them to complete reviews.

In conclusion, this project highlights the importance of detecting fake reviews and proposes a machine learning-based approach to achieve this. The study shows that SVM is a powerful algorithm for this task, but there is potential for further improvement by incorporating more reviewer behavioural characteristics. The findings of this research have practical implications for businesses, consumers, and researchers in the field of e-commerce.

Keywords

Customers, E-Commerce, Fake Reviews, Machine learning.

INTRODUCTION

In today's digital age, reviews are the primary source of information for customers when making purchasing decisions. Whether it's a product or service, customers rely on the feedback and opinions of others to gauge its value, features, and ratings. As a result, reviews have become a crucial source of authentic data for most people in online services [1]. However, the presence of fake reviews that aim to mislead customers has become a significant concern. Detecting fake reviews has thus become a crucial and active research area.

Machine learning techniques can play a crucial role in detecting fake reviews from online content. One of the web mining tasks, content mining, involves extracting useful information using various machine learning algorithms. Opinion mining is a common example of content mining, where sentiment analysis techniques are used to analyze the sentiment of the text, positive or negative [2]. Detecting fake reviews, however, requires building features that go beyond the content itself, such as the reviewer's style, review time/date, or other attributes. Thus, successful fake review detection lies in the development of meaningful features that can accurately identify fake reviews [3].

EXISTING SYSTEM

Machine learning is becoming more prevalent, with classical and machine learning approaches used in computer science. This section discusses relevant research on detecting fake reviews and how machine learning techniques outperform conventional ones [4]. However, the current methodology has following Disadvantages.

Disadvantages

Low Accuracy.
High Time and space complexity.
Highly inefficient in terms of memory.
Requires skilled persons for operation.

PROPOSED SYSTEM

To address the limitations of the existing system, we propose a new application that leverages machine learning techniques and a Python-based environment. The goal of this project is to provide a reliable, quick, and accurate mechanism for detecting fake reviews. We used robust methods and various machine learning algorithms to develop this system, and it has the potential for future updates based on the evolving requirements of fake review detection [5].

In summary, our proposed system is expected to provide significant benefits in detecting fake reviews and contribute to the field's growth. It aims to overcome the limitations of the existing system, such as low accuracy and high time complexity, and provide an efficient and trustworthy mechanism for identifying fake reviews.

Algorithm

Support Vector Machine (SVM) Classification

Support Vector Machine (SVM) is a popular algorithm used in machine learning for classification and regression problems. The primary use of SVM is for classification problems, where the goal is to classify data points into different categories based on a set of features. SVM aims to create the best line or decision boundary that can effectively separate the data points into different classes [6].

The decision boundary created by SVM is known as a hyperplane, and the algorithm selects extreme points or vectors known as support vectors to create this hyperplane. The support vectors are data points that are closest to the decision boundary and play a significant role in the creation of the hyperplane. SVM is widely used for various applications such as face detection, image classification, text categorization, and more [7]. For instance, in image classification, SVM can be used to identify whether an image contains a specific object or not. SVM can also be used in text classification to categorize text into different categories such as positive or negative sentiment. One of the advantages of SVM is that it can handle high-dimensional data with ease. SVM is also effective when the number of features is greater than the number of data points. SVM can also handle non-linear decision boundaries by using kernel functions.

In conclusion, SVM is a powerful algorithm for classification problems and has several applications in various fields. Its ability to handle high-dimensional data and non-linear decision boundaries makes it a popular choice for many machine learning tasks [8].
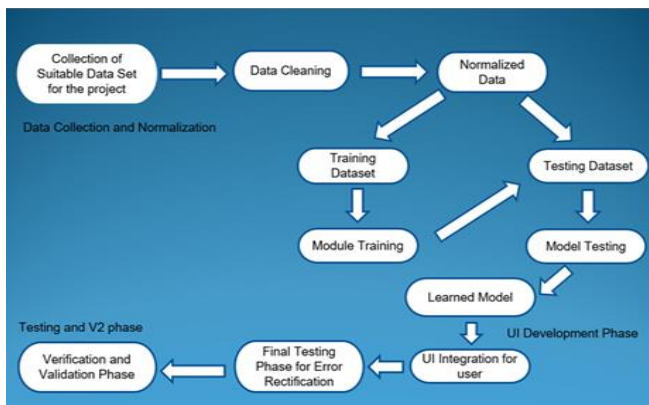
Architecture

Figure 1. System Architecture Diagram

The above system architecture diagram (Figure 1) depicts the method for developing the project from initial state to the final stage. The stages of development are described clearly.

MODULE DESCRIPTION

In this, we have created a machine learning model that is effective at predicting whether or not an internet review is false. The fundamental principle utilized to identify reviews as being fake is that they should be produced unfairly by machine [6]. The review is regarded as legitimate and authentic if it was written by hand. And we also developed a sample commerce website incorporated with this machine learning model for user understanding and for producing real time results [9][10].

RESULTS

Table 1. Accuracy of Different Algorithms

S.No	Algorithm Name	Accuracy
1	**K Nearest Neighbours Algorithm**	**57.67%**
2	**Random Forest Algorithm**	**83.53%**
3	**Support Vector Machine Algorithm**	**87.72%**

The above table (Table 1) provides the accuracy of different algorithms. This accuracy is calculated with the help of testing data set in Testing Phase.

Figure 2. Results

Description of Results

From the above results (Figure 2), we can clearly see that Support Vector Machine (SVM) performs clearly in classifying the reviews as OR or CG followed by Random forest classifier and KNN is averagely performing by giving only 57% accuracy. Thus, we can conclude that Support Vector Machine (SVM) with an accuracy of 87.72% is a clear winner in detecting fake reviews.

Figure 3. Website Home Page

After logging in user is directed to the above displayed website home page(Figure 3) where he can see the list of products available.

Figure 4. Products Page

The above screen (Figure 4) is accessible to the admin only and it gives the reviews given for different products in product page.

CONCLUSION

In this study, we have emphasized the importance of reviews and their impact on almost every aspect of web-based data. Reviews have a significant influence on people's decisions, making it crucial to detect fake reviews. This study proposes a machine learning-based method for detecting fake reviews, taking into account both the characteristics of the reviews and the reviewer's behavior. The proposed method is evaluated using a dataset collected from the internet, utilizing a range of classifiers. In the developed method, bi-gram and tri-gram language models are employed and compared. The results indicate that the Support Vector Machine (SVM) classifier outperforms the other classifiers in identifying fake reviews. The study also suggests that considering the behavioral characteristics of reviewers can enhance the performance of the proposed method. Although the current work considers some of the reviewer's behavioral characteristics, future research could integrate more behavioral elements, such as the frequency of a reviewer's reviews, the time taken to complete reviews, and the number of positive or negative evaluations submitted. Incorporating more behavioral variables in the strategy for detecting fake reviews is expected to improve its performance.

In summary, this study proposes a machine learning-based approach for detecting fake reviews, which takes into account both the characteristics of the reviews and the reviewer's behavior. The findings suggest that the SVM classifier is effective in identifying fake reviews, and the inclusion of additional behavioral variables can further enhance the performance of the proposed method.

FUTURE SCOPE

The Present Scope is to detect the review is a Computer Generated or an Original Review given by reviewer and display it. This project can be a base foundation and it can be incorporated with any website which wants to detect the type of reviews in it. It is scalable and suitable for advancement and development. It can also be a reference study model for upcoming developers who are keen to work in this area.

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