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ijirset@gmail.com

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Fake Reviews Detection System for Online Product Reviews Using Machine Learning

Rohit Tupe, Ganesh Palapure, Parth Kambli, Sahil Pawar, Prof: Manisha Singh

Student, Department of Computer Engineering, Dhole Patil College of Engineering, Pune, India

Professor, Department of Computer Engineering, Dhole Patil College of Engineering, Pune, India

ABSTRACT: People often place their trust in products based on product reviews and ratings. Reviews can have an impact on a company's or a brand's profile. The company must examine market reactions to its products. Popular reviews, on the other hand, are difficult to track and arrange. In social media, many public viewpoints are difficult to manually process. The next step is to develop a mechanism for automatically categorizing favorable and negative public feedback. Customers will be able to see how the product performs in terms of consistency, efficiency, and guidance, which will provide prospective buyers a better knowledge of the product. The applicability of web assessments from suppliers in order to fulfill client requirements by evaluating beneficial input is one such unfulfilled possibility. Good and bad reviews are important in determining customer demands and gathering product feedback from customers. Sentiment Analysis is a type of computer analysis that collects contextual information from text. A large number of internet mobile phone ratings are studied in this study. We divided the text into positive and negative categories, as well as feelings of disappointment, expectation, disgust, trepidation, delight, regret, surprise, and confidence. This clearly defined category of feedback aids in a comprehensive evaluation of the product, allowing consumers to make better decisions.

KEYWORDS: Machine Learning, Social Media, Text Mining, Text Classification, Sentiment Analysis, and Online Reviews

I. INTRODUCTION

Many businesses and software sectors store their data in Social networking creation provides the customer with an ability to share his or her views. That means the organization can't monitor the contents of the virtual universe now. Complaints in social media are submitted by customers who are not pleased by a company's services or goods. On the other hand, consumers are still optimistic for a commodity in the social media. This view could affect other potential clients, including positive or negative ones. Potential consumers can find out about a certain product before deciding to purchase goods.

An appraisal of the sentiment is expected to immediately decide whether the feeling is negative or positive. Feeling analyses are a subset of text mining that focuses in the text of a person's feeling, mood and attitude. The fundamental theory of sentiment analysis consists of categorizing the polarity of texts and determining whether they are positive or negative. Sentiment analyses are commonly used as rapid social network growth. For different places public opinion is becoming really critical. There have been some difficulties in collecting public examination.

Many product evaluation pages have recently been published on the Internet. It invites scientists to carry out a consumer review sentiment analysis. On product evaluations, customer opinion was evaluated in this paper.

II. RELATED WORK

In this paper [1], author provides a method for detecting false product reviews that combines content and usage data. The suggested approach takes advantage of both product reviews and the behavioural qualities of reviewers, which are linked via specific spam indications. To properly assess reviews generated over "suspicious" time intervals, fine-grained burst pattern recognition is used in this research. The reviewer's previous reviewing history is also used to determine the reviewer's overall "authorship" reputation as an indicator of the authenticity degree of their most recent reviews.



This study [2] investigates the effects of online customer evaluations on consumer agility and, as a result, product performance using a big data analytical method. Using large-scale customer review texts and product release notes, the authors construct a singular value decomposition-based semantic keyword similarity method to evaluate consumer agility. Our empirical analysis demonstrates that review volume has a nonlinear relationship with customer agility, using a mobile app data set with over 3 million online reviews. Furthermore, consumer agility and product performance have a curved relationship. This study adds to the body of knowledge in the field of innovation by proving the impact of a company's capacity to use online customer feedback on product performance. It also aids in the resolution of contradictions in the literature concerning the links between the three components.

In this research [3], authors observed that reviewers' posting rates (the number of reviews they write in a given period of time) follow an unusual distribution pattern that has never been documented before. That is, their rates of posting are bimodal. Multiple spammers also have a tendency to publish reviews to the same set of products in a short period of time, a practice known as co-bursting. Furthermore, the author discovered some intriguing patterns in the temporal dynamics of individual reviewers as well as their co-bursting behaviors with other reviewers. The authors suggest a two-mode Labeled Hidden Markov Describe to model spamming using only individual reviewers' review posting times, based on their findings. The Coupled Hidden Markov Model is then used by the authors to capture both reviewer posting habits and co-bursting signals.

Authors [4] This study proposes using statistically based features that are modelled through the supervised boosting approach such as the Extreme Gradient Boost (XGBoost) and the Generalized Boosted Regression Model (GBM) to evaluate two multilingual datasets in order to improve the detection of opinion spams in the mobile application marketplace (i.e. English and Malay language). According to the results of the evaluation, the XGBoost is best for detecting opinion spams in the English dataset, while the GBM Gaussian is best for the Malay dataset. The application of the proposed statistical based features yielded a detection accuracy rate of 87.43 percent on the English dataset and 86.13 percent on the Malay dataset, according to the comparative study.

Authors propose [5] assessing numerous user features and then defining their aggregate behavior in a unified manner, a unique hierarchical supervised-learning strategy to increasing the likelihood of identifying anomalies has been developed. The author uses univariate and multivariate distributions to model user attributes and interactions. Then, using supervised-learning techniques like logistic regression, support vector machine, and k-nearest neighbors, stacks these distributions to create robust meta-classifiers. The authors conduct a thorough analysis of methodologies before coming up with empirical findings. Online business platforms are interested in this method since it can assist minimize fraudulent reviews and boost consumer confidence in the accuracy of their online information. This study adds to the body of knowledge by combining distributional elements of characteristics into machine-learning approaches, which can help detect bogus reviewers on digital platforms.

Different performance indicators are routinely employed to evaluate the accuracy of review spam detection programmes, according to this study [6]. Finally, this paper provides an overview of several feature extraction methodologies from review datasets, as well as a proposed taxonomy of spam review detection algorithms, assessment metrics, and publicly available review datasets. Also discussed are research gaps and future goals in the field of spam review identification. The success factors of any review spam detection approach include interdependencies, according to this study. The accuracy of review spam detection methods is based on the feature engineering strategy chosen, and the feature extraction is reliant on the review dataset. As a result, these aspects must be examined in conjunction with one another for the successful deployment of the spam review detection model and improved accuracy.

Nowadays [7], Customers' decisions are heavily influenced by online reviews. Online reviews have become a basis of decision for anything from buying a blouse on an e-commerce site to dining at a restaurant. However, because people are often in a rush and don't have time to pay attention to the finer points of products and services, their reliance on internet reviews has increased. Because of the reliance on online evaluations, some people and organizations manufacture spam reviews in order to boost or degrade a person's, product's, or organization's reputation. As a result, it is impossible to tell if a review is spam or a ham with the naked eye, and manually classifying all of the reviews is equally unfeasible. To detect spam reviews, a spiral cuckoo search based clustering algorithm has been devised. The proposed technique resolves the cuckoo search method's convergence issue by combining the strength of cuckoo search with the Fermat spiral. Four spam datasets and one Twitter spammer dataset were used to test the efficiency of the suggested technique.



Nowadays [8] with the increasing popularity of Internet, online marketing is going to become more and more popular. This is due to the fact that many products and services are readily available on the internet. As a result, consumer and organizational reviews of all of these products and services are critical. Unfortunately, fraudsters utilized to create bogus reviews for the purpose of profit or advertising. Customers and businesses are unable to form accurate conclusions about the products due to the phoney reviews produced by scammers. These bogus reviews, often known as review spam, must be identified and removed in order to avoid deceiving potential buyers. We used a supervised learning strategy to detect review spam in this paper. The proposed work builds models utilizing a variety of variables and sentiment scores, and their performance is assessed using several classifiers.

This article [9] has been examined in the consumer electronics domain and presents a feature framework for detecting false reviews. The contributions are divided into four categories: I Using scraping techniques, construct a dataset for classifying fake reviews in the consumer electronics domain in four different cities; (ii) define a feature framework for fake review detection; (iii) develop a fake review classification method based on the proposed framework; and (iv) evaluate and analyse the results for each of the cities under study.

In this paper [10], It is suggested that a review processing approach be used. To determine the usefulness of reviews, some parameters have been proposed. These factors illustrate how a particular review differs from others, raising the likelihood that it is spam. According to the score awarded to the review, this system categorizes it as useful or non-useful.

III. PROPOSED METHODOLOGY

The first step is to identify and calculate spammer behavioral features in an unlabeled Amazon review dataset. This calculation is carried out on all dataset reviews based spam review detection using behavioral features method.

System Architecture:

The Fig.1 shows the proposed system architecture.

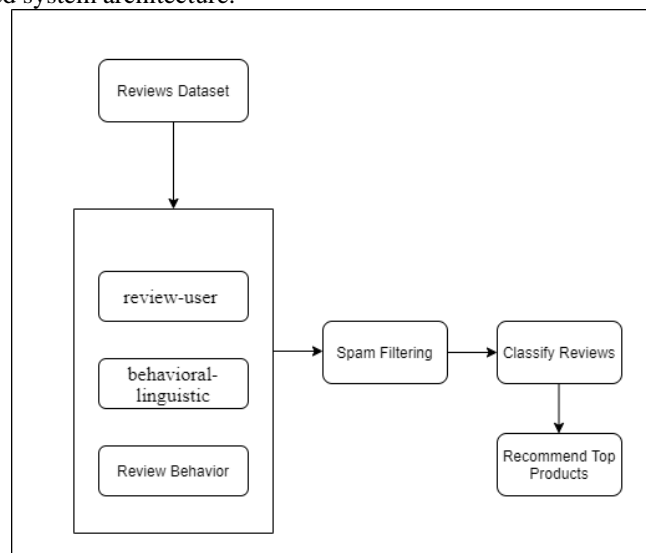


Fig 1. System Architecture

- SpamDup framework that is a novel network based approach which models review networks as heterogeneous information networks.
- A new weighting method for spam features is proposed to determine the relative importance of each feature and shows how effective each of features are in identifying spams from normal reviews.
- The SpamDup framework outperforms the state-of-the-art in terms of time complexity, which is heavily influenced by the number of features used to detect a spam review.



Our suggested framework's fundamental notion is to describe a given review dataset as a Heterogeneous Information Network (HIN) and transfer the challenge of spam detection into a FIN classification task. In particular, a model review dataset in which reviews are linked together using various node kinds. The flowchart of the SpamDup framework is shown in Figure 2.

IV. RESULT AND DISCUSSION

Experiments are done by a personal computer with a configuration: Intel (R) Core (TM) i3-2120 CPU @ 3.30GHz, 4GB memory, Windows 7, MySQL 5.1 backend database and Jdk 1.8. The application is web application used tool for design code in Eclipse and execute on Tomcat server.

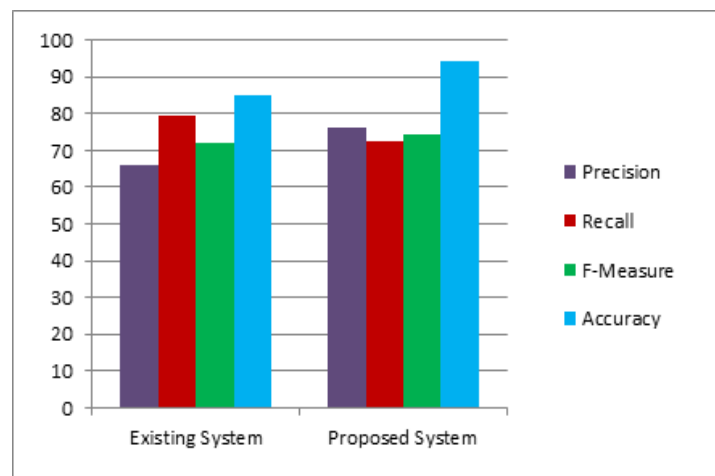


Fig 2. Performance Analysis between existing and proposed system

The proposed SpamDup framework time complexity is $O(e^2 n)$. The SpamDup framework accuracy is 94.06% which is better than SPaglePlus Algorithm accuracy is 85.14% on using product dataset.

V. FUTURE SCOPE

For future work, metapath concept can be applied to other problems in social media. For example, similar framework can be used to find spammer communities. For finding community, reviews can be connected through group spammer features and reviews with highest similarity based on metapath concept are known as communities.

VI. CONCLUSION

Sentiment Analysis is a case study that looks at the feeling, mood, entropy or feelings of people. This paper addresses a basic issue of the study of feelings and the classification of feelings of polarity. Data was compiled from online product reviews of Amazon.com. A method known as the categorization of emotion polarity and POS along with thorough explanations of each phase was proposed. These measures include pre-processing, pre-filtering, partitioning, data consistency. Functionality that include machine learning expertise. Much work has been done in opinion mining and consumer evaluation in the form of a study of documents, sentences, and features. Opinion Mining can become a most interesting field of study for potential preferences by using a number of found function expressions derived from the reviews. More novel and successful approaches need to be invented to address the existing difficulties of mining opinion and sentiment analysis.



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