

Fake Product Review Detection and Removal

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Abstract: *Online reviews are often the primary factor in a customer's decision to purchase a product or service, and are a valuable source of information that can be used to determine public opinion on these products or services. Reliance on online reviews gives rise to the potential concern that wrongdoers may create false reviews to artificially promote or devalue products and services. This practice is known as Opinion (Review) Spam, where spammers manipulate and poison reviews (i.e., making fake, untruthful, or deceptive reviews) for profit or gain. We propose to build a fraud risk management system based on data processing and intelligent risk-mitigation models. It captures fraudulent transactions based on user behaviors and network, analyses them in real-time using Data Mining, and accurately predicts the suspicious users and transactions. This system proposes behavioral approach using J48 CLASSIFIER to detect review spammers who try to manipulate the ratings on some target products.*

Keywords: Fake Review detection, Review Removal, J48, classifier

1. Introduction

As the Internet continues to grow in both size and importance, the quantity and impact of online reviews continually increases. Reviews can influence people across abroad spectrum of industries, but are particularly important in the realm of e-commerce, where comments and reviews regarding products and services are often the most convenient, if not the only, way for a buyer to make a decision on whether or not to buy them. While online reviews can be helpful, blind trust of these reviews is dangerous for both the seller and buyer. Many look at online reviews before placing any online order; however, the reviews may be poisoned or faked for profit or gain, thus any decision based on online reviews must be made cautiously. Furthermore, business owners might give incentives to whoever writes good reviews about them pay someone to write bad reviews about their competitor's products or services. These fake reviews are considered review spam and can have a great impact in the online marketplace due to the importance of reviews. In this paper, we discuss about how the proposed system helps in detecting and removing the fake reviews with an emphasis on data mining technique using 'J48 Algorithm' along with the performance of the system.

2. Literature Survey

Opinion Mining has attracted to a great deal of research earlier. However, not a great amount of work has been done in this field. Review Spam is very hard to detect unless read manually. Here are some of the work proposed and implemented. Paper [1] proposes three types of new features like review density, semantic, and emotion and gives the model and algorithm to construct each of these features. Although, it is not a good metric and the reduction is not substantial. Paper [2], have used linguistic features like unigram presence, unigram frequency, bigram presence, bigram frequency and review length to build a model and find fake reviews. Although, the main problem is data scarcity and it requires both linguistic features and behavioral features. Paper [3] proposes behavioral approach to detect review spammers who try to manipulate the ratings on some target products. an aggregated behavior scoring methods for rank reviewers is derived Paper [4] proposes to employ categories of lexical semantic and linguistic features in the detection of online spam reviews. In Paper [5] we found that spotting the individual fake reviews was quite a difficult task but spotting the groups was comparatively easier one Frequent item set mining(FIM) method is used to analyze the dataset. Paper [6] first performed a comparison using real-life filtered (fake) and unfiltered (non-fake) reviews in Yelp. The results showed that the real-life data is much harder to classify, with an accuracy of only 67.8%.

Table 1: Gap Analysis

S.No	Title	Publications	Work Done	Research Gap
1	Detecting Fake Reviews Utilizing Semantic and Emotion Model	IEEE'16	Computation of Semantic Similarity will result in 3 features including Review Density, semantics and emotion	It is not a good metric. The reduction is not substantial.
2	Fraud Detection in Online Reviews using Machine Learning Techniques.	IJCIER'15	NAÏVE BAYES CLASSIFIER requires both linguistic & Behavioral features with 81% ACCURACY	It makes a very strong assumption on the shape of your data distribution. Another problem happens due to data scarcity
3	Fake Review and Brand Spam Detection using J48 Classifier.	IJCSIT'15	J48 CLASSIFIER resulted in behavioral approach using AMAZON dataset with 93% ACCURACY	Space complexity is very large.
4	Online Review Spam Detection by New Linguistic Features.	University of Maryland Baltimore County'15	Used Support Vector Machine (SVM) with 92% ACCURACY	The major downside of SVMs is that they can be painfully inefficient to train.

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5	Fake Reviewer Groups' Detection System.	IOSR-JCE'14	Frequency Item set Mining(FIM) method finds clustered review which is comparatively easier to handle	Assumes database transaction is memory resident. Requires up to 'm' database scan.
6	Fake Review Detection: Classification and Analysis of Real and Pseudo Reviews.	UIC-CS'13	Used Amazon Mechanical Turk (AMT) With 90% ACCURACY	The appropriate 'wage' for each task is difficult to assess. Tasks that require rigorous programming cannot be done online.

3. Design

Our research show that it is possible to detect spam comments with the proper selection of features which can capture different characteristics of legitimate comments in order to differentiate them from spam comments entered by the spammers. Initially, a particular dataset is used for identifying and differentiating the good and the bad reviews with the help of keywords mostly used for the reviews and then, the input from a user is selected for detecting the spammed reviews. After the selection, the product is reviewed for spam detection. Spam detection technique using J48 Algorithm is used to check for spams in the reviews and such reviews are differentiated using the decision tree and the spam reviews are detected. After detecting the spam, the spam content is separated from the legit reviews and then, the spam content is analyzed so as to ensure the nature of the spam. System controller is used to detect the fake spams which are to be deleted by the admin later on in the process. After the process the users can view the final set of legit reviews for buying their favored products from the website.

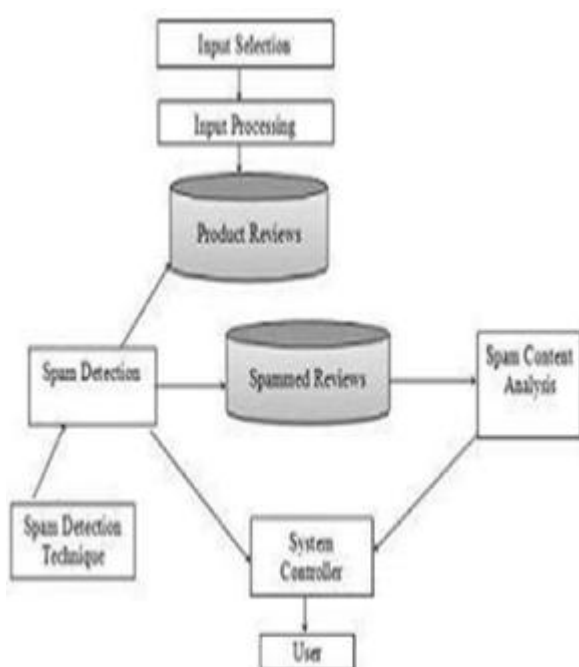


Figure 2: System Architecture

Testing

Performance Testing

a) Application Performance

- 1) The application runs natively on an android device. As such there are no performance slowdowns due to emulation.

- 2) The application is as responsive as the device's hardware capabilities will allow it to be.
- 3) Application will perform well on newer devices while also supporting older devices.
- 4) Application launches within 100ms on newer devices while it takes around 200-300ms to launch on older devices with less capabilities.
- 5) All internet-based interactions depend on the device's network quality.
- 6) In no scenario will the app crash due to bad internet connection.

b) Server Performance

- 1) Server is always connected to the internet using a ethernet connection with 100mbps(minimum) to 1Gbps(maximum) connection which is online 24/7.
- 2) The server responds to all connection requests and network downlinks in less than 10ms latency.
- 3) Amount of time taken by server to respond to uplinks varies from 15ms to 70ms.

Stress Testing

a) Server Stress test

- 1) In the scenario of more than 100 connections the server may increase latency on per transaction basis by up to 10%.
- 2) If the connection to the server is on a congested network, the time taken by server to respond depends on how congested the network is.
- 3) If server fails to respond in less than 5 second the request times out and user must input again.
- 4) Server is auto recoverable, as such it will come back online by itself as soon as network allows connections.

b) Recovery Testing

- 1) If the server fails due to internal errors, recovery procedure requires manual handling.
- 2) If server fails due to external error such as internet downtime or network congestion, it recovers as soon as internet is online or network is congestion free.

Algorithm

1. Step 1: Enter login Details of Admin, Buyer, Seller.
2. Step 2: Seller uploads the product and give certain description.
3. Step 3: Buyer selects the product and give reviews.
4. Step 4: Admin verifies the given review.
5. Step 5: If 'Brand Spam' is displayed, go to Step 8.
6. Step 6: If 'Fake review' is displayed, go to Step 8.
7. Step 7: If nothing is displayed, go to Step 9
8. Step 8: The Review is fake and Admin removes it from the database.
9. Step 9: The Review is genuine.
10. Step 10: Exit.

4. Implementation Methodology

The proposed system has been implemented earlier using various methodologies like Naïve Bayes, Sentimental analysis, J48, Natural language processing techniques and few others. All of them have resulted in successful implementation of the desired system. Efficient result has been taken from bank dataset using weka tool in the experiment. Naive Bayes classifier also showing good results. The experiments results shown in the study are about classification accuracy and cost analysis. J48 gives more classification accuracy for classmortgage in bank dataset having two values Yes and No.

The requirements are as follows:

Hardware Requirements

Desktop
Server Machine

Software Requirements

Netbeans
JAVA
MySQL

Working of the System

This is a backend module and as such does not have any user interface. Following functions are included in this module:

- 1) Customer Servlet: Contains method for checking if the inputs received from login activity are authentic or not.
- 2) Registration Servlet: Contains methods that register the input credentials entered by the user while using register activity.
- 3) Device Servlet: Registers and authenticates user's device at the time of logging in, registration and transaction processing.

Table 2

OS	Windows
Memory	512 MB
Storage	10 GB
Technology	JDK 8
Tools	Net Beans IDE 7.4

5. Results

Fake product review detection system will be useful to business organization as well as to customers. When used on e-commerce dataset the accuracy will be around 90%-96% if the data is going to be a labelled and supervised data, but, if the data is a unsupervised unlabelled data then the accuracy might vary in comparison to supervised data.

Outcomes

Business organization can benefit by monitoring their product sold by analysing and understanding what the customers are saying about products. Customers can make decision whether he/she should buy or not buy the products. This can be helpful to people to purchase valuable product and spend their money on quality products. Our application will first do analysis with the help of J48 Algorithm on the reviews posted by the users and then post the genuine review

on genuine products. And user can be sure about the products availability on that application and reviews too.

6. Conclusion

Determining and classifying a review into a fake or truthful one is an important and challenging problem. As part of future work, we can incorporate review spammer detection into the review detection and vice versa. Exploring ways to learn behavior patterns related to spamming so as to improve the accuracy of the current regression model. So as to evaluate our proposed methods, that conducts user evaluation on an Amazon dataset containing reviews of different manufactured products. We derive an aggregated behavior scoring methods for rank reviewers according to the degree that they demonstrate spamming behaviors. We found that here proposed methods generally outperform the baseline method based votes. We further learn a regression model from the user labeled ground truth spammers.

7. Future Scope

As part of future work, we can incorporate review spammer detection into the review detection and vice versa. Exploring ways to learn behaviour patterns related to that spamming so as to improve the accuracy of the current regression model is also an interesting research direction.

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