Fake Product Review Monitoring and Removal for Genuine Online Reviews

Carloine El Fiorenza [1], Aditya Singh Kashyap [2], Kartikey Chauhan [3], Kishan Mokaria [4], Aashutosh Chandra [5]

[1]Assistant Professor, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, India.

[2,3,4,5] Student, Computer Science and Engineering, SRM Institute of Science and Technology, Chennai, India.

Abstract – In today's world reviews on online websites play a vital role in sales of the product because people try to get all the pros and cons of any product before they buy it as there are many different options for the same product as there can be different manufactures for the same type of product or there might be difference in sellers that can provide the product or there might be some difference in the procedure that is taken while buying the product so the reviews are directly related to the sales of the product and thus it necessary for the online websites to spot fake reviews as it's their own reputation that comes into consideration as well, so a Fake Review Detection is used to spot any fraudulent going on because it's not possible for them to verify every product and sale manually so a program comes into the picture that tries to detect any pattern in the reviews given by the customers.

Index Terms – Review Monitoring, Opinion Spam Analysis, Genuine Online Reviews, Sentiment Analysis.

1. INTRODUCTION

The scope and need of online markets and e-commerce platforms are on the rise and many people buy products from these platforms. The amount of feedbacks for products as a result are also present in detail for users to analyze the product they are buying. This can work against the users as well because users can sometime bombard the review section with extreme opinion comments which can work in favor or against the product. Thus we need to take care of this because this can be done either by the merchant to increase the value of his product or the user to degrade the ratings of that product. In general the reviews can be classified as genuine or fake review. They tend to use the same review or slightly revised for different products. This duplication can be divided into four categories, (1) duplicates from the same customer id on the same product, (2) duplicates from different customer id on same product, (3) duplicates from the same customer id on different products, (4) duplicate from different user id on different products. The fake review detection will compare the attributes and sentiments from the attributes of the reviews with the attributes and sentiments from the attributes of the other reviews and take into account the value of the similarity between the two reviews. The intention of this research is to distinguish the fake opinions posted about products and the genuine one to intentionally change the overall sentiment of the products. The proposed system will save their efforts and time by helping the users and business organizations identify spams

from different opinions quickly and also help in purchasing their valuable products from a trustworthy site. To ensure credibility of the reviews posted on a platform, it is important to use a strong detecting model. We do not summarize the reviews by selecting a rewrite some of the original comment, from the reviews to capture the main points as in the classic text summarization. Our task is performed in steps: (1) while login the customer will be verified using his/her e-mail id; (2) mining product features that have been commented on by customers; (3) identifying opinion sentences in each review and deciding whether each comment positive or negative; (4) and while giving opinions if its fake then e-mail id is blocked; (5) summarizing the results.

2. RELATED WORK

The current system works on the dataset where the ratings are present on the scale of 1 to 5. Then a dictionary is made out of the current tokens and words in the given review which can be helpful in defining a sentiment index and can provide some weightage. SentiWordNet is the tool used for creating a dictionary of sentiment tokens. We divide the review sentence into individual tokens.

POS tagging was conducted by utilizing the Stanford Part-Of-Speech (POS) tagger. It is a software that reads text and determine the part of speech for each token. This process produced a tag in the form of abbreviations. For this process, a desktop application was developed using Java. This process started with training the tagger model. Input from this process is a sentence from review and produce POS tag for each token that is stored into the database. All the spam reviews deduced are deleted from the dataset. In our paper, we consider the features of a product, for example- for a Smartphone; we consider display, camera, battery life, speakers, etc. Then, we divide the respective features in a series of sub-features.

In data mining the task of finding relationship among data is very important. Many algorithm developed for this task, ie apriori, fp growth, eclat, relim etc. Among other algorithm, apriori and fp growth have been studied in large scale. Textual information generally classified into two main categories, ie the fact and opinion. Facts are objective statements about entities and events in the world. Opinion are subjective statements that reflect the sentiment or perception of entities and events.

The sentiment score shows a review's sentiment polarity. That is, the degree of how good or bad a review is. We calculated the sentiment score by incorporating the sentiment weightage of each word in the review. The score will be in the scale of -1 to 1. We match the weightage of the sentiment defining words with the words in our Dictionary, and then, add all the weightages to calculate the total score. Words such as adjectives and verbs are able to convey the opposite sentiment with the help of negative prefixes

We normalize the product ratings (1 to 5) to a scale of -1 to 1. All the reviews have their respective ratings from -1 to 1. We calculate the sentiment score of each of them, and subtract the two. The reviews wherein the difference of the sentiment score and the rating is greater than 0.5, is considered to be spam. This is considered spam because a greater difference signifies a greater inconsistency between the two. All the spam reviews deduced are deleted from the database.

It can be concluded that the use of ratings alone to assess whether the review is fake or genuine is inadequate, because the information that can be processed is very limited. The drawback of this method is, some process need to be optimized, so it can detect a fake review in a short amount of time. Judging suspicious spammer is a complex task, which requires intuition and also ability to search for additional information. To decide whether this reviewer is a review spammer or not, the judge must read the reviews and collect evidence about relationship between these reviews to the other reviews, also how the relationship between reviews of all products that has reviewed by this reviewer with another review by other reviewers. Although, some of the algorithms have been used in opinion spam analysis gives good results, but still no algorithm can resolve all the challenges and difficulties faced by today's generation. Sometimes fake reviews also seen as good quality review and it was modified like no one can identify their actual intension. More future work and knowledge is needed on further improving the performance of the opinion spam analysis.

3. PROPOSED MODELLING

The flowchart given below gives us an overview of how the system will work and how the each and every module of the process will function. The flow chart is given as follows-
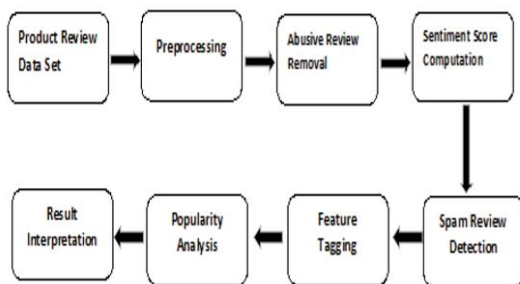

Figure 1: System Architecture

The following are the steps in the followed to implement in the given process-

1. Admin will add products to the system.

2. The preprocessing of data takes place so that useless content is filtered out before the analysis process.

3. The reviews containing explicit content and with swear words are not taken into consideration and are removed from the dataset.

4. Sentiment score for each word is calculated when words are extracted into a form of dictionary or so called 'Bag of Words(BOW)'

5. The reviews are normalized on a scale of -1 to +1 and sentiment score of that review is calculated. If they cross 0.5 means they are spam.

6. Analysis of product after spam removal is done on the basis of their respective features..

7. The popularity of particular review is also taken into consideration, if the users like that review means it is contributing towards the product.

8. All the modules are implemented and the final result is interpreted on the admin side and required action is taken on analyzed reviews.
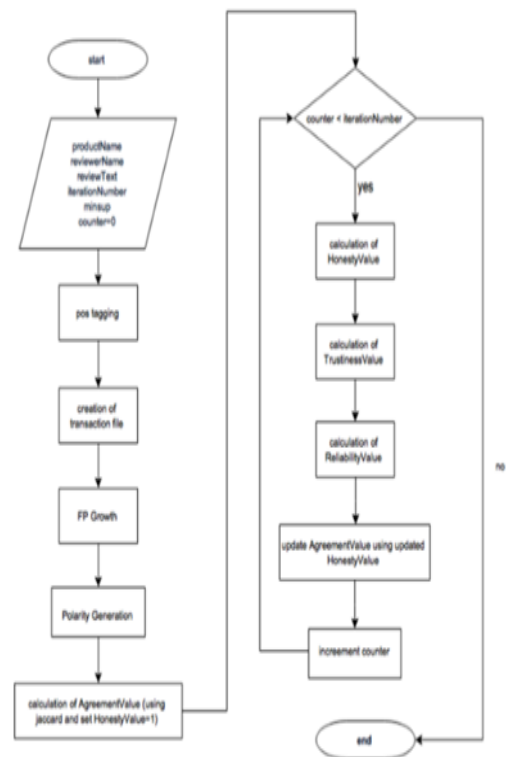

Figure 2: Flowchart Representation

4. RESULTS AND DISCUSSIONS

A. POS Tagging

It is also known as Parts of Speech (POS) tagging. Here every words are tagged into some index which helps in the future reference in the reviews. They are done so that we can easily handle words which are regularly used or are present in different reviews.

B. Creation of transaction file

Transaction file in this research contains all tokens that are stored in the database from a products that its tag value is noun. Each row in the transaction file was a noun from every sentence for a product. This transaction file became the input for the FP Growth process

C. FP Growth

This process aimed to identify the features that has the most comment. In this study, the features are properties or attributes from a product. For example, for camera, the feature can be its battery, memory card etc. This information actually available on amazon, but, datasets related to this information were not publicly available, so to get information about product's feature, this research used fp-growth algorithm from association rule mining technique.

D. Polarity Generation

The feature or attribute resulted from the previous process will be identified its opinion orientation. For example, for a camera, the feature or attribute that can be identified is the battery, the comment related to the battery from userId X is "this battery drain pretty fast, and you do not want to be stuck somewhere with a dead battery". The purpose of this process is to identify the opinion orientation from a sentence that contains the attributes that were identified from the previous process. Whether its orientation positive, negative or neutral. From the example above, its opinion orientation is negative.

E. Calculation of agreement values.

The next process was calculate the agreement value that illustrates how similar the feature and its opinion orientation resulted from the polarity generation process with the other reviews.

- **Sentiment Categorization Technique**

The score of the review is calculated with formula:-

$$TSI = \frac{p - \frac{tp}{tn} \times n}{p + \frac{tp}{tn} * n}$$

- **Sentiment Score Calculation**

A sentiment token is a word or a phrase that conveys sentiment. Given those sentiment words proposed, a word token contains a positive (or negative) word and its speech of tag. Given a token t, the formula for t's sentiment score (SS) computation is given as:-

$$SS(t) = \frac{\sum_{i=1}^{5} i \times \gamma_{5,i} \times Occurrence_i(t)}{\sum_{i=1}^{5} \gamma_{5,i} \times Occurrence_i(t)}$$

Occurrence (t) is t's number of occurrence in i-star reviews, where i=1,...,5. Since 5 star reviews are present in abundance, we have formulated a ratio $\gamma5,i$, which is defined as:-

$$\gamma5, i = |5 - star| / |i - star|$$

1. Testing of the application

The accuracy of dictionary is calculated by comparing the sentiment score of the review calculated by it and the score calculated by NLTK text processing online portal and VADER sentiment dictionary. Accuracy is the ratio of the no. of reviews with correct sentiment score and the total no. of reviews. The accuracy deduced by these methods comes out to be 57.2%.

We find the number of those which abusive. Out of 627 product reviews, 10 reviews are found to be abusive, and hence, removed, and 48 are found to be spam.

Total reviews	Abusive	Remaining
627	10	617

Initial	Spam	Remaining
617	48	569

Table 1: Testing and reviewed data table

5. CONCLUSION

From our work we have come to a conclusion that finding the opinion spam from huge amount of unstructured data has become an important research problem. Although, some of the algorithms have been used in opinion spam analysis gives good results, but still no algorithm can resolve all the challenges and difficulties faced by today's generation. It is very important to consider certain quality measures like helpfulness, usefulness and utility while analyzing each review. In the literature survey there are many sophisticated methods explained which defines the sentiment analysis with respect to different aspects. Our application which will help the user to pay for the right product without any getting into any scams. Our application will do

analysis and then post the genuine reviews on genuine product. And user can be sure about the products availability on that application and reviews too. In future we would try to improve the method of calculating the sentiment score of the reviews. We would also try to update our dictionary containing sentiment word. We would try to add more words in our dictionary and update the weights given to those words to get more accurate calculated score of the reviews. Sentiment analysis or opinion mining can be applied for any new applications which follow data mining rules. A direction for future research is to implement the system and check performance by applying proposed approach to various benchmark data sets. The main objective of our work is to create a system which will detect spam and redundant reviews and to filter them so that user correct knowledge about the product. Aim of our project is to enhance customer satisfaction as well as to make online shopping reliable. The project will detect the fake reviews by deploying opinion mining algorithms and creating a word dictionary.

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