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FAKE REVIEW DETECTION USING OPINION MINING

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ABSTRACT

As e-commerce is growing and becoming popular day-by-day, the number of reviews received from customer about any product grows rapidly. People nowadays heavily rely on reviews before buying anything. This instigates many people to write fraud and useless reviews about other related products or service. Even there are some organizations in the market who are hiring professionals to write fake reviews and promote their products or defame its competitors' product. Hence, we aim to develop a method which will detect fake reviews and annotate them. The proposed method automatically classifies users' reviews into "suspicious", "clear" and "hazy" categories by phase-wise processing. The hazy category recursively eliminates elements into suspicious or clear. This results into richer detection and be useful to business organization as well as to customers. Business organization can monitor their product selling by analyzing and understanding what the customers are saying about products. This can help customers to purchase valuable product and spend their money on quality products. Finally end users sees each individual review with polarity scores and credibility score annotated on it.

1 .INTRODUCTION

Recent social media growth has made it possible for users to publish opinions about things, people, events, and subjects in a range of formal and informal ways. Reviews, forums, social media posts, blogs, and discussion boards are a few examples of these types of environments. The computational analytics involved with such text is referred to as the problem of opinion mining and sentiment analysis.

[1]. Enhancing customer happiness, boosting conversions, and improving revenue are the main goal of collecting customer reviews. Regularly updated customer reviews attract more people to the website. Online customer reviews are a crucial element of the purchasing process for e-commerce sites. A product's page will have a greater chance of getting more traffic and a higher click-through rate on search engine result pages if it has an acceptable rating

[2] Many positive reviews on the platform increase the chances of encouraging clients to spend extra on services/products. Favourable reviews will increase client trust in the brand. Negative reviews may damage the company's reputation, credibility, and reliability. Numerous buyers are hesitant to buy from firms with no or many unfavourable evaluations.

[3]. Customers are 86% less likely to buy from companies with poor ratings. A bad review may turn off 22% of buyers, and the unfavourable reviews can turn off 59%. As a result, any poor e-commerce product reviews might harm the brand and cause a drop in sales.

[4]. It is time-consuming and inaccurate to classify positive and negative reviews manually; as a result, the development of automatic methods to identify the sentiment of thoughts has become essential. The majority of the opinion mining-based approach for false review detection has used conventional machine learning methods using the term frequency- inverse document frequency (TD-IDF) values, and subsequently, the discrimination of linguistic features is also estimated to enhance the accuracy of the system.

PROBLEM DEFINITION/ RESEARCH GAP

The main agenda is to further improve customer satisfaction and online shopping experience. In order to do so, it has become a common practice for online merchants to enable their customers to put forward their reviews on the products that they have purchased. With more computer users becoming comfortable with the Web, a huge number of people are coming forward to write the reviews and post them on website which is becoming beneficial for other customers. It also decides profit or loss for any e-commerce merchant. As an outcome of this, the number of reviews that a product receives is growing quickly. Most of the famous products get thousands of reviews at some large merchant sites. Now any customer can write any opinion text or review, this can draw the individual's attention and organizations to give undeserving spam opinions to promote or to discredit some target products. The existing system doesn't restrict spam and invalid reviews and comments. So there is a need to develop

a smart system which automatically mine opinions and classify them into spam and non-spam category.

2. OBJECTIVE OF THE STUDY

- **Research and Survey:** In this one review's the most recent researches minutely related in the theory problem statement and the question. Once we analyse the thesis, the existing procedures in spam detection for non-Arabic opinion reviews, identifying the drawbacks or the flaws in the existing approaches, we prepare the strategies and solutions on how to proceed or extend in order to be overcome in our research.
- **Data Acquisition:** In this step, we prepare an in- house data set of spam reviews and reviewers using human collected from online e-commerce websites or application like Amazon, Flipkart with different characteristics and sizes. The records are chosen randomly from any of the records that are available on the website.
- **Data Integration:** In this step, we combine the data from multiple review source data sets into a coherent form.
- **Spam Identification Labelling:** In this step, we look for various types of the spam in the data integrated set, and labelled each record as spam and non-spam manually.
- **Pre-processing:** In this step, we use various types of pre-processing techniques to handle the missing, noisy and inconsistent data. There are a number of pre-processing techniques such as case folding dam character erase, tokenization, slang word handling, stop word removal, stemming and number handling.
- **Processing Stage:** In this step, we will first have to implement the following steps:

1. Data mining classification.
2. Text mining classification.
3. Data-Text mining classification.

Now we apply each preceding step by more than one classification method.

3. LITERATURE REVIEW

The purpose of a literature review is to gain an understanding of the existing research and debates relevant to a particular topic or area of study and to present that knowledge in the form of a written report. Conducting a literature review helps you build your knowledge in your field.

A. Data Acquisition: In this step, we prepare an in-house data set of spam reviews and reviewers using human collected from online e-commerce websites or application like Amazon, Flipkart with different characteristics and sizes. The records are chosen randomly from any of the records that are available on the website.

B. Data Integration:

In this step, we combine the data from multiple review source data sets into a coherent form.

C. Spam Identification Labelling:

In this step, we look for various types of the spam in the data integrated set, and labeled each record as spam and non-spam manually.

D. Pre-processing: In this step, we use various types of pre-processing techniques to handle the missing, noisy and inconsistent data. There are a number of pre-processing techniques such as case folding dam character erase, tokenization, slang word handling, stop word removal, stemming and number handling.

E. Evaluate the Approach:

In this step, analyzation of the outcome and rationalize the feasibility of the approach we followed by comparing it with other previous approaches. The Public Opinion Survey conducted consisted of several questions relating to the purpose about analyzing the importance of product review for various customers while buying any product. The participants in the survey are mostly the frequent online buyers. The survey is designed as such to know the public opinion about referring to the product review while buying it. The result of the survey was as expected and was in favors of the arguments proposed earlier.

4. COMPARATIVE ANALYSIS

Sentiment is a feeling, thought or judgement. It is also known as opinion mining, which studies people's feelings toward any entity. Internet is full of resources with respect to sentiment information. From user's point of view, people can post their own matter on several social networking websites, such as forums, micro-blogs, etc. Figure 6.1 is a flowchart that focuses our proposed model for categorization and it is the outline of this paper also. Our contributions mainly lies in Phase 2 and 3 In Phase 2: 1) For negative phrase identification, an algorithm is proposed and implemented; 2) For sentiment score computation, a mathematical approach is proposed; 3) For sentiment polarity categorization, a feature called vector

generation method is presented.

In Phase 3: 1) Based on sentence- level and review- level, two sentiment polarity categorization experiments are performed respectively; 2) Performance of three classification models are evaluated and compared based on their experimental results.

Data Collection Information used in this paper is collected from flipcart.com. In total, we have collected, approx. 2.2 million product reviews in which the products belong to different categories, such as, beauty, book, electronic, and home (Figure 6.2(a)). Those online reviews were posted by over million of reviewers (customers) towards 20051 products. Each review contains the following information: 1) reviewer ID; 2) product ID; 3) Ip address; 4) time of the review; 5) date of review; 6) review text. Fig 6.2: Data collection (a) Data based on product categories (b) Data based on review categories Each and every rating is based on a 5-star scale (Figure 6.2(b)), resulting the rating to be ranged from 1- star to 5- star. It does not contain any halfstar rating or quarter- star rating.

5. PROPOSED WORK OVERVIEW

In this paper, we introduced an opinion mining- based fake review detection using deep learning technique that concatenates group of lexicons, a model for Word2vec, and an attention mechanism (AM) to express sentiment observation. AM is used to create sentiment data from SentiWordNet and the Liu's lexicon. However, the context of the text is first determined using the Word2vec model before analysis. These two tasks work together to handle the linguistic problems using the deep learning model. Before generating the text's sentiment features from the context, it attempts to comprehend the words in terms of their sentiment conflict. This process simulates how a person could approach this problem. As shown in Fig. 1, the system is divided into three primary components, and the following sections provide descriptions of each component.

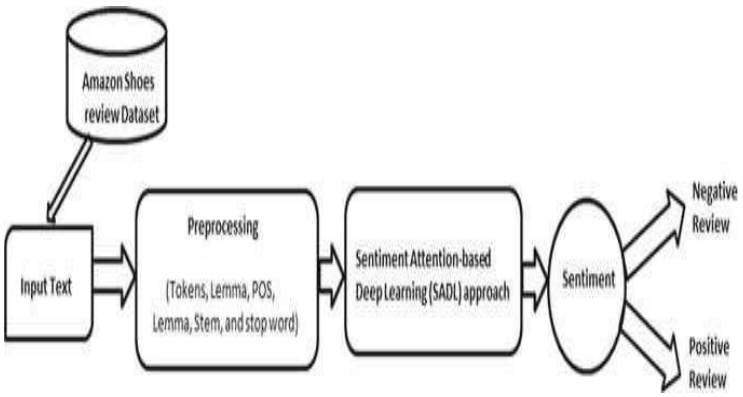

Fig. 1 Architecture of the proposed system.

3.1 Text Pre-processing In sentiment analysis, text pre-processing is one of the important step for analysing the information from social networks, this is an important task in sentiment analysis. Our pre-processing method is composed of four steps: (i) Text extraction; (ii) Text cleaning; (iii) Lemmatizing; and (iv) Negation marking. Language grammar and structure are used in this NLP-based method. By word lemmatizing with WordNet, downstream analysis tasks that involve matching terms from the text with those from lexicons are made simple.

Text extraction

In the text extraction, few sentences in the reviews are first divided into clauses based on the punctuation that is available at the clause level.

Text cleaning

This will change the capital letters to lowercase and eliminate any special characters.

Lemmatization

By using this technique, the text is changed into its stemmed form. Recent methods in the literature frequently apply an intelligent approach to collapse various word templates by seeking to remove affixes. Suffixes ending with -es (or) -s can make a noun singular or plural. For a verb to be in its present or past participle form, apply the suffixes -ing or -ed. The -est suffix allows adjectives to take comparative or superlative forms. SentiWordNet searches for synsets of a particular word are, however, impractical because of the erroneous stemmed forms produced by these algorithms. In this work, we adopted the methodology from [12], in which SentiWordNet and WordNet lemma were used to retrieve word synsets and sentiment scores.

3.2 Embedding of Attention Word

One of the most important developments in deep learning research is attention mech-nanism (AM). According to word sentiment scores, the proposed technique uses lexi-cons and AM to teach students how to concentrate on the key words in a phrase. The proposed method considers the word representations in the forms of either seman-tics or sentiment by using of both lexicons and Word2vec models. SentiWordNet and the Liu's lexicon are used to extract word sentiment information. To retrieve the sentiment information from the lexicons, the sentiment score calculation method is used.

3.3 Components of Opinion Mining-Based Fake Review Detection Using Deep Learning Technique Approach.

Dropout

It was suggested t o use dropout as a regularization strategy for neural network (NN)

classifiers. When training, dropout method picks neurons at random that are not used. The activation of downstream neurons is not influenced by these neurons during the forward phase, and no updation of weight is made to the neurons during the back propagation step. The most common method of resolving overfitting is dropout. The proposed approach is also useful for handling low priority levels. Bi-directional LSTM The LSTM, a particular gated RNN, was introduced to handle the issue of handling long- term reliance. Fundamental building blocks of an LSTM network architecture are input gates, output gates, forget gates, and memory cells. The memory cell travels immediately through the entire chain to store the information for either long or short periods of time. What data should be removed from the cell is determined by the forget gate. Which fresh information will be added to the cell's memory is decided by the input gate. The output gate controls how much data the LSTM produced. The proposed system includes a BiLSTM to combine more data in the form of sentiment and semantics.

Dense layer In the proposed system, the output is categorized into positive and negative opinions using a fully connected dense layer with a SoftMax function.

6. CONCLUSION

There have been made several attempts for spam review detection till today. In this paper, we propose a general framework to detect spam reviews. Sentiment analysis or opinion mining is a field of study that analyzes people's sentiments, feelings, or emotions towards certain entities. This paper tackles a fundamental problem of sentiment analysis, sentiment polarity categorization. Now a day's technology is growing day by day and there are so many website and application available in the online market by which they sell their product. Every product contains millions of reviews and on basis of these reviews user buy the product most of the time. There are some organizations which post fake reviews on genuine product and user gets stuck. Our software will help the user to pay for the right product. Our software will do analysis and then if any fake review is found from any IP address consistently then admin user can block that IP address. It also sends mail to user regarding blocked IP address. In this way it monitors the fake review made on any product. And user can be sure about the products availability on that application and reviews too.

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