

Fake Product Review Monitoring System

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Abstract – In today's world, both businesses and customers believe reviews to be quite beneficial. It's no surprise that review fraud has devalued the whole experience, from nasty reviews putting harm to the business's credibility to breaking international laws. This has been seen as a developing problem, and because it is related to natural language processing, it was critical to develop various machine learning methodologies and techniques to achieve a breakthrough in this sector. Many e-commerce sites, such as Amazon, have their systems in place, including Verified Purchase, which labels review language as accurate when items are purchased directly from the website. This work proposes to use Amazon's verified purchases label to train three classifiers for supervised training on Amazon's labelled dataset. MNB, SVM, and LR were chosen as classifiers, and model tuning was done using two distinct vectorizers, Count Vectorizer and TF-IDF Vectorizers. Overall, all of the trained models had an accuracy rate of 80%, indicating that the vectorizers functioned admirably and that there are distinctions between false and actual reviews. Out of the two, the count vectorizer improved the models' performance more, and out of the three inside counts, LR performed the best, with an accuracy rate of 85% and a recall rate of 92%. The LR classifier was used, and it was accessible to the public to see if the reviews entered were genuine or not with a probability score.

Keywords - opinion mining, sentiment analysis, text mining

I –INTRODUCTION

Current trends, e-commerce has been one of the very happening fields. In General, it provides facility for customers to write reviews concerned with its service. The existence of these reviews can be used as a source of information. Before purchasing anything, it is a normal human tendency to surf reviews on that product. Based on reviews, customers can compare different brands and can finalize a product of their interest. These online reviews can change the opinion of a customer about the product. If these reviews are true, then this can help the users to select proper product that satisfies their requirements. On the other hand, if the reviews are manipulated or unreal, then there are chances that it can mislead users. This resulted in the development of a system which detects fake reviews for a product by using the text and rating property from a review. The honesty value and measure of a fake review is often measured by utilizing the data mining techniques. An algorithm could very well be used for tracking customer reviews. Fake reviews include dishonest or inaccurate information. They are used to misinform consumers, so, they make wrong purchase decisions, thus affecting the revenues for products. Spam product reviews are three types: Deceitful reviews, Reviews of a specific brand and non-reviews.

1) Deceitful (fake) reviews of products that are written to mislead customers. They include undeserving positive reviews to promote the online trade of specific products and negative reviews to defame worthy products. This type of spam product review is called hyperactive spam products reviews.

2) Reviews of a brand only: these opinions target the manufacturer brands instead of the product itself.

3) Non- reviews, which have two sub-kinds:

(a) announcements and (b) unrelated reviews that contain no opinions, such as interrogations, responses or undefined text.

II -LITRATURE REVIEW

Review spam is strenuous to detect unless read manually. Here are some of the works proposed and implemented.

Following Papers: -

- Proposes behavioral approach to detect review spammers who manipulate the ratings on some target products wherein an aggregated behavior scoring methods for rank reviewers are derived.
- Proposes that spotting the individual fake reviews were quite grueling unlike spotting the groups which was comparatively easier. One frequent item set mining (FIM) method is used to analyze the dataset.
- In the approach was to detect the fake review by identifying the IP address of the user ID that is recorded multiple times.
- In 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 proposes 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.
- In paper scraping processing is used to build the data set from yelp and then Fake Feature Framework for organizing the extraction and characterization of features in fake detection. Their framework is composed of two main types of features: review centric and user centric. Review centric features are only related to the text of the review and User centric features show how the user behaves within the site.

III- OBJECTIVE

- To implement different algorithm to get better Spam Detection i.e.; IP Address, Account used Negative Word Dictionary using Senti-strength, Ontology.
- Graphical representation of work.
- To presents Opinion Mining on Spam Filtered Data.
- To implement Ontology in Spam Detection
- To present an algorithm that does Opinion Mining with Spam Detection.

IV-PROPOSED SYSTEM

The system proposed will include methods like collection of datasets from Kaggle and pre-processing them.

A. Pre-Processing

The term Pre-processing the data is defined as the process of converting a data into an understandable format by cleaning it and preparing the text for classification. Texts from online contain usually lots of noise and uninformative parts such as scripts and advertisements. Processing includes certain steps such as online text cleaning, white space removal, expanding abbreviation, Stemming, stop words removal and feature selection. These might reduce the noise in the text which helps to speed up the performance of the classifier. Before carrying out the transformation and victimization of the sentences of the reviews, pre-processing steps were used to clean the data and remove noise. The goal of text pre-processing is to convert the texts of the reviews to a form that deep learning algorithms can understand and analyse. The pre-processing steps are as follows:

- a) Removing punctuation: deleting punctuation marks from the reviews.
- b) Removing stop words: This process cleans articles from the text; for example, 'the', 'a', '' words are removed from text.
- c) Stripping useless words and characters from the dataset.
- d) Word stemming: converting each word of a sentence into its root; for instance, 'undesired' becomes 'desire'.
- e) Tokenizing: splitting whole sentences in the text into separate words, keywords, phrases, and pieces of tokens.
- f) Padding sequences: using deep learning neural networks to ensure that the input data have equal sequence length. However, we implemented a pre-padding method to add zeros to the beginnings of the vector representation.

Understanding deviation of ratings: -

- The ratings or reviews which are showing a trend of continuous growth but suddenly shows negativity is simply displaying a deviation from the normal ratings.

Sentiment analysis of the product review: -

It is necessary for the system to understand whether the review is positive or negative, which further helps to understand the deviation from either the positivity or the negativity in the reviews. The analysis will help us to understand the overall aspect of the products so that few spam reviews doesn't affect the overall statistics of products.

- The posted reviews will undergo the process of sentiment analysis, IP address track, and its deviation from overall reviews. In-case of miscalculations, reviews will be analyzed and detected. Web Scripting is an automatic method to obtain large amounts of data from websites. Most of this data is unstructured data in an HTML format which is then converted into structured data in a spreadsheet or a database so that it can be used in various applications. This large amounts of data from a website are used to train an algorithm. Web scraping requires two parts namely the crawler and the scraper. The crawler is an artificial intelligence algorithm that browses the web to search the data required by following the links across the internet. The scraper, on the other hand, is a specific tool created to extract the data from the website. The design of the scraper can vary greatly according to the complexity and scope of the project so that it can quickly and accurately extract the data. When a web scraper needs to scrape a site, first it is provided the URLs of the required sites. Then it loads all the HTML code from those sites and a more advanced scraper might even extract all the CSS and JavaScript elements as well. Then the scraper obtains the required data from this HTML code and outputs this data in the format specified by the user. Initially, a website is created which contains featured products of famous brands

Users have to login to the website for entering reviews. Once the reviews have been entered, machine learning algorithms will be used for classifying them into fake or real. Fake or spam reviews will be removed thereafter from the website. Only their views which remain truthful gets published in this process. Thus, the product review website is an efficient and effective way for users to know about the actual information of the product.

B. We Are Using Two Machine Learning Algorithms

1. TF-IDF Victimizer: TF-IDF Victimizer (Term Frequency-Inverter Document Frequency): TF-IDF which stands for Term Frequency– Inverse Document Frequency is a statistical method of evaluating the significance of word in given documents. This is very common algorithm to transform text into a meaningful representation of numbers which is used to fit machine algorithm for prediction. TF- IDF victimizer is defined with parameter (stop words='English') which eliminates all the common English words.

2. Naïve Bayes Classifier: Naïve Bayes Classifier is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions. It is a probabilistic classifier, which means it predicts based on the probability of an object. It is called Bayes because it depends on the principle of Bayes theorem, which is used to determine the probability of a hypothesis with prior knowledge. It depends on the conditional probability. Naïve Bayes Classifier works on the following steps:

- Convert the given dataset into frequency tables. Generate Likelihood table by finding the probabilities of given features. Now, use Bayes theorem to calculate the posterior probability. Formula: $P(c|x) = \frac{P(x|c) P(c)}{P(x)}$

Referred from Bayes's theorem, in probability theory, a means for revising predictions considering relevant evidence, also known as conditional probability or inverse probability.

- Passive Aggressive Classifier Passive-Aggressive algorithms are called so because Passive- If the prediction is correct, keep the representation and do not make any interchanges. i.e., the data in the example is not enough to cause any changes in the representation. Aggressive- If the prediction is incorrect, make interchanges to the representation.

i. e., some interchange to the representation may correct it. Understanding the mathematics supporting this algorithm is not very simple and is supporting the scope of a single article.

- Admin will add products to the system.
- User need to enter their email id and OTP no to enter the system .
- User once access the system, user can view product and can post review about the product.
- For posting reviews, the user's id will be verified.
- And admin will also block the email id of the user if

- reviews are spammed.
- Admin will delete the review which is fake.
- Admin Login: - Admin login to the system using his admin ID and password.
- Add product: - Admin will add product to the system.
- Delete Review: - Admin will remove the review which tracked by the system as fake.
- User Login: - User will login to the system using his user ID and password.
- View product: - User will view product.
- Post Review: - User can post review about the product.

V-FUTURE DEVELOPMENTS

For future developments, a web application can be designed which makes the process of finding out fake reviews easier. Every user will be given an account through which they can write reviews for various products. The app would automatically filter out fake reviews based on the proposed Machine Learning algorithm. Eventually, customer will get rid of fake reviews present in online shopping websites. In future work, hybrid models and new models can be tried for the fake review detection model research can speed up the process of execution.

VI-CONCLUSION

Determining and classifying a review into 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 to improve the accuracy of the current regression model. To evaluate our proposed methods, that conducts user evaluation on an Amazon dataset containing reviews of different manufactured products.

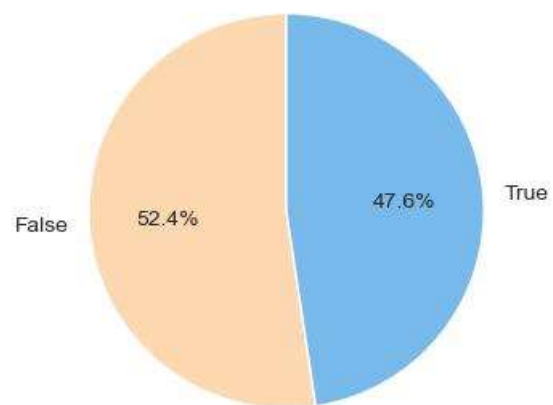
VII-EXPERIMENT EDA ON THE REVIEW TEXT

We have conducted an in-depth review surrounding the background of the Amazon dataset, and this time the review text itself is going to be taken a further look. To aid in our pre-processing, certain columns will be added to understand certain instances the sentences have. Those include the counts of:

Summary Statistics

After dropping the duplicates, we can see that the percentages of the True and False values are still near equal, and hence we can say that the dataset is balanced. Taking a closer look into the graph, there are more False values and True values within the dataset now. From above we can see that 5-star rating is still the highest, and that true reviews still are more than false values within 5 star. Sentiment is still highly positive within this dataset.

True and False Reviews Count



PRE-PROCESSING

Text pre-processing is a technique for cleaning text data and preparing it for use in a model. Text data comprises noise in the form of emotions, punctuation, and text in a different case, among other things. When it comes to Human Language, there are many different ways to communicate the same thing, and this is only the beginning of the difficulty. Machines cannot comprehend words; they want numbers, thus we must convert text to numbers efficiently. From the summary statistics conducted, we can see that the noise mentioned are having occurrences within the review text, and hence the pre-processing will be conducted accordingly. To Do

1. Drop unwanted columns
2. Lower casing
3. Remove Stop words
4. Remove Punctuation and Special charas
5. Stemming



We have conducted an in-depth review surrounding the background of the Amazon dataset, and this time the review_text itself is going to be taken a further look. To aid in our pre-processing, certain columns will be added to understand certain instances the sentences have. Those include the counts of:

1. Word
2. Characters (with spaces)
3. Stop words
4. Punctuation
5. Uppercase characters

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