

Amazon's Fake Review Detection using Support Vector Machine

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Abstract:—Online user data is crucial to the marketing process since it affects consumers' daily lives. False product reviews have a negative impact on the enterprise's capacity to analyse data and make decisions with confidence. Some users have a propensity to disseminate unconfirmed fake news on internet sites. Today, it is crucial to be able to recognise fake reviews. Many websites provide things for sale to consumers online. Purchasing decisions can be made based on product reviews and market demand. On the basis of reviews, consumers determine whether a product is acceptable for use or not. There will be hundreds of comments about the product, some of which may be false. We provide a mechanism to identify fake reviews of items and indicate whether they are reliable or not in order to distinguish between them. This approach for identifying false reviews describes the use of supervised machine learning. This methodology was devised in response to gaps because traditional fake review detection methods classified reviews as authentic or false using either sentiment polarity scores or categorical datasets. By taking into account both polarity ratings and classifiers for false review identification, our method contributes to closing this gap. A survey of already published articles was conducted as part of our effort. Support Vector Machine[2], a machine learning technique, used in our system produced accuracy of 80%.

Keywords—Amazon, Fake review detection, supervised machine learning, support vector machine(SVM)

INTRODUCTION:-

Nowadays, internet shopping is one of the most significant components of our everyday life. A lot of regular people rely on online reviews to decide which product to purchase. Customer reviews are a key factor in determining a company's income on e-commerce platforms. In this day and age, it is simple to deceive and manipulate a consumer by posting a false review of a certain product. According to the UK's Competition and Markets Authority (CMA), fake or false reviews may annually affect £23 billion in consumer purchasing in the country. On Amazon, 61% of the reviews on devices are fake. One in seven reviews on Tripadvisor can be false. Numerous false reviews on online review sites like Tripadvisor, Yelp, etc. either increase or decrease the popularity of a hotel or product. Many website visitors are unable to quickly recognise fake reviews. As a result, the buyer is duped and their perception of real items is manipulated. We thus decided to develop a user-friendly fake review detection system to stop people from being duped by fake reviews in order to overcome this discrepancy between fake and factual reviews.

Literature Survey:-

Fake feature framework is used in [1] which characterization and organisation features of fake reviews are done and is composed of 2 types-review. Techniques applied on amazon electronic product reviews for analysing user centric features resulted in F-score of 82% accuracy using Random forest or Ada boost classifiers. The system [2] centred around Opinion-Mining which is a fake review detection using Sentiment Analysis. They had developed a working model that annotates individual reviews were gathered in the dataset. It was also found that Sentiment Analysis is a Method of Implementation in which Vader found out if a piece of text is favourable, negative, or neutral is the process of sentiment analysis. Most techniques used for sentiment analysis fall into one of two categories: polarity-based (where texts are categorised as either positive or negative) or valence-based (where the strength of the sentiment is taken into account). For instance, in a polarity-based approach, the terms "good" and "great" would be considered equally, but "excellent" would be treated as more positive than "good" in a valence-based approach. In another research [3], Two main

Categories of fake reviews were identified as textual (depends on the content of the reviews) and behavioural (depends totally on reviewers writing style, emotional expressions and frequent number of times he writes them. Several types of machine learning models were used to distinguish between fake and real reviews.

Identification was done by taking into account 'key features of review' along with 'behaviour of the reviewer'. Without behavioural features-Logistic Regression gave 87.87% accuracy in bi-gram, KNN and LR gave 87.82% accuracy in tri-gram and with behavioural features SVM gave 86.9% accuracy in bi-gram. A system developed for detecting fake reviews of hotels on yelp [4], tripadvisor and many more websites. The system design includes a web crawler which gathers all the data of the reviews and stores it into MySQL database. The false reviews were identified using four different methods, viz. Text mining-based categorization, spell checking, reviewer behaviour checking, and hotel environment checking. The ultimate chance of false reviews for a particular hotel is calculated using a grading method using the individual probabilities after all components have been assessed. The usual pre-processing suggestions were followed when implementing the text mining-based false detection method. About 14% of the reviews were classified as fraudulent. This data source has previously been utilised and validated by prior research for assessing the genuinity of the hotels. One of the studies focused on Sentiment analysis [5] and Machine Learning approach in finding the Fake reviews. This system used ML Algorithms Naïve Bayes, KNN, SVM, Decision Tree (j48). SVM (81.75%) [5] outperforms other algorithms in both w/ and w/o stop word approaches. The assumption was made that classification of Fake reviews is either True or False [6]. When recognising fake reviews, it is important to consider the reviewer's credibility, the dependability of the product, and the reviewer's honesty. As a result, Naïve Bayes delivered 98% accuracy whereas Random Forest produced 99% accuracy. Another research [7] centred on the methods used for classifying fake reviews which are Content based method which considers POS tag frequency count as a feature and Behaviour Feature based method which considers unfair rating as a feature. The unsupervised machine learning algorithm used for this purpose is Expectation Maximisation which gave accuracy of 81.34% and supervised machine learning algorithm used is SVM and Naïve Bayes which gave accuracy

of 86.32%. One of the studies [8] suggested Combination of classification algorithms with LDA which yielded higher accuracy results. The traditional SVM, Logistic regression and Multi-layer perceptron model gave accuracy of 65.7%, 80.5% and 80.3% respectively. When combined with LDA the SVM, Logistic Regression and Multi-layer perceptron model gave accuracy of 67.9% and 81.3% respectively. Three techniques are used in the system [9] to classify false reviews. The first one is Review Centric Approach which considers content of review, use of capital letters, and numerals. The second approach is Reviewer Centric approach which considers profile image, URL length, IP address, etc and the third approach is Product Centric Approach which considers rank of product, price of product as feature. The algorithms used to detect the fake reviews were supervised, unsupervised and semi-supervised. One of the systems we studied focuses on annotating the sentiments of a review [10] using VADER. The gathered reviews are cleaned and opinion mined, after which the sentiment analysis step takes place. The results of the sentiment analysis are then appended to the dataset and classified using vector calculation. Research [11] primarily focused on reviews that were produced with the intention of seeming authentically misleading. Sentimental analysis was performed in the system [12] on the dataset. Two classification models were described which were 2 way classification which classifies reviews into positive or negative and 3 way classification which classifies data into positive, negative or neutral which was followed by sentiment analysis. Further experimental works were carried out using R which is an open source statistical programming language and software environment. It is mostly useful for data manipulation, data analysis, calculations and visualisation of results in graphical format. Using reviewer history and behaviour analysis is another way to detect fake reviews discussed in [13]. The research mainly discusses how a user can be identified as a bot using jaccard similarity. The reviews of a product can be considered manipulated if they are excessively positive or negative and having similar structuring.

1. Methodology:

From the research we conducted and seeing how previous systems worked, our proposed methodology

is as follows. First step will be scraping the reviews from the link provided by the user on the website. The web scraping is performed using selenium. After the reviews are stored in json format, the required details will be extracted, i.e pulling out only the required text from the review, whether the review is positive or negative, etc. The ML model will be ready at this point and the extracted data will be fed to it. The algorithm will then predict if the reviews are fake or real according to the trained dataset. This output will be visualised to the website so the user will be able to identify how genuine the reviews are. The figure 1.1 describes the block diagram of the proposed methodology.

The steps summarised are as follows-

1. Scraping of the reviews from yelp
2. Extraction of the required details
3. Transferring the data as input to models.
4. Fitting algorithms to training set
5. Predicting the test results.
6. Visualising the test set result.

PROPOSED SYSTEM

This section explains the proposed in detail and it is carried out in four major phases so that we can find out the best model that will be used to get the maximum accuracy and fastest in terms of speed.

Using **web scraping**, data will be collected from the online websites.

Pre-processing- A very important step of machine learning since the data present on different sites is not clean and of no use. A series of steps will be followed to remove the unwanted things from the statements on the yelp dataset that was created so that it can be further used for computational purpose.

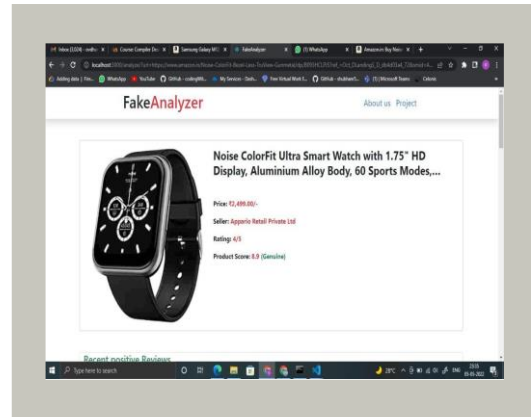
1) Tokenization: This is the initial phase or the very common step before applying any other preprocessing techniques. The text is divided into individual words called tokens. For example, if we have a sentence (“sudha is a very beautiful girl”), this process will divide it into tokens such as (“sudha”, “is”, “a”, “very”, “beautiful”, “girl”).

2) Stop Words Cleaning: words used most but hold no value or less valued are known as stop words. (a,an,this,the) are the most common examples. In this paper, stop words are removed from the data before further processing in fake review detection

. Fig 1.2 Product need to be given by user

3)

4) Lemmatization: Lemmatization method is used to convert a word to a singular one from the plural form of it. It aims to return the base form of the word from the dictionary. For example: converting the word (“Studied”) to (“study”).



Sentiment analysis- it is applied on the dataset and gives polarity scores between +1,-1 or 0 that is positive, negative or neutral.

Feature extraction/Engineering- it mainly involves reduction of the number of resources so that a large dataset can be described. Selection of the appropriate features for predicting the results.

Model selection- Selection of the appropriate model for the classification of real and fake review will be done to get the required result.

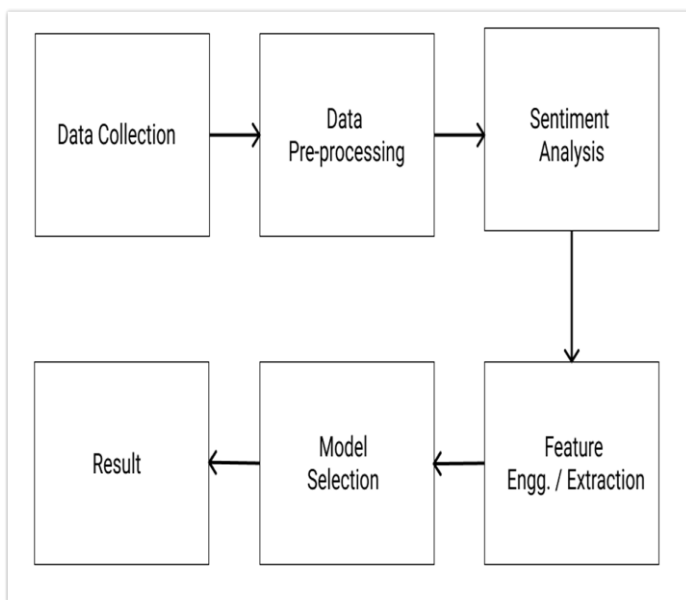
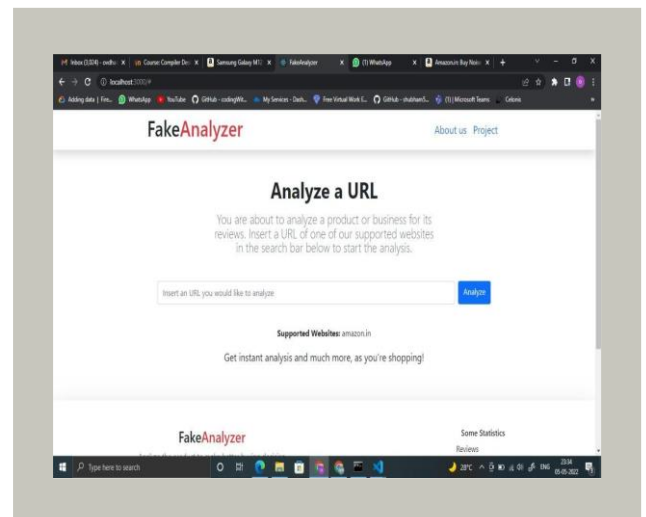


Fig1.1Proposedsystem

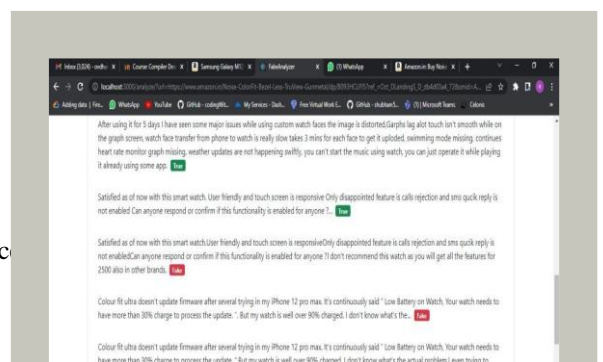


Fig 1.4 Reviews will be displayed along with the labels as true or fake guiding the customers in purchase of the product

Accuracy obtained is about 80% using the support vector machine algorithm.

CONCLUSION:

Algorithms for supervised machine learning were used to distinguish between fraudulent and legitimate reviews. Since the business will receive honest consumer reviews of the goods, both the client and the firm will profit. Based on the classification of fraudulent reviews, customers will be able to purchase the best goods. In the future, we'll concentrate on websites like Yelp and Flipkart and work to distinguish between fraudulent and authentic reviews so that users may simply pursue their daily interests.

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Leveraging Reviewer Historical
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