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Detect Eliminate Prevent Fake Reviews and Reviewers in E-Commerce Website

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ABSTRACT

In e-commerce, user reviews can play a significant role in determining the revenue of an organization. People rely on online reviews for making their purchasing decision as these reviews can provide a lot of useful information about the goods or services. These online reviews also help firms in understanding customer sentiment and behavior. However, fake or manipulated reviews are also posted to promote or demote the quality of the products or services which mislead the consumers and guide them to make wrong decision. Identification of fake review is difficult and their detection is currently an important issue. Thus, detecting deceptive reviews is getting more importance day by day. Sentiment analysis has great importance in fake review detection system. This project focuses on detecting eliminating fake reviews using Ensemble model that can classify fake and genuine sentimental reviews efficiently and prevention of fake reviews is achieved by making sure the right person gets to write the review by sending the review id to the registered email-id using BoughtAuth technique that use Genuine Reviewer Protocol by generating review id for bought product. The novelty of the method lies in that the features and the classification labels of the new reviews will be added into the initial sample set as new samples. Furthermore, a web-based user interface is created to provide a platform that combines the knowledge of the input user information with the chosen machine learning model to perform fake review detection on the input data. The proposed work achieved the accuracy of 87% in detecting fake reviews written in English by using intelligent learning techniques which is greater than the accuracy of the previous systems.

Keywords: Machine learning, Random Forest Classifier, Classification, Word cloud

I. INTRODUCTION

Fake reviews are inconsistent with real evaluations of products or services; thus, fake reviews are false, bogus, and deceptive reviews. Such reviews might be posted by different types of people, including consumers, online merchants, and review platforms. The deciding feature of fake reviews is whether they mislead consumers[1]. A fake review is a review written by someone who has not actually used the product or service. They can be written by friends, family, or employees of the company. Fake reviews are also generated by bots and companies who pay individuals to write fraudulent reviews. Companies get fake positive reviews to increase sales, or source negative reviews on other companies to bring down their competitors[2]. Such reviews can have a significant effect on product perception. Fake reviews decrease informativeness, information quality, and the effective use of online product reviews. Fake reviews also damage the credibility of reviews, and negatively affect review helpfulness. In addition, fake reviews seriously affect the development of online product reviews and stakeholders' commitment to the reduction of information asymmetry between merchants and customers. Online sellers tend to publish positive fake reviews for their products or negative fake reviews against competitors for financial gains.. In that same survey, 78% of people said Amazon product reviews play a big role in their purchase decisions. If we can't trust these online reviews—and the recent discovery that over 200,000 people were involved in a fake reviews scheme with third-party. Amazon also struggles to identify fake reviews that come from real customers who've bought and used a product. Their behavior looks legitimate, and the same customer might write some reviews that are paid and others that aren't. Another major challenge to Amazon is that the fake reviews are often coordinated on social media sites the company doesn't control. But the problem remains pervasive enough -- with many retailer's eagers to edge out their competitors -- that shopper can't really tell if the number of five-star reviews on a product is legit or artificially inflated[3]. Consumers unsure of what to believe when they're up against the prospects of dozens of copycat items in an Amazon marketplace that hosts nearly 2 million sellers globally. The effects of fake reviews have engendered serious concern and various theoretical models are employed to highlight the consequences of fake reviews[4].

II. PROBLEM STATEMENT

The proposed framework followed in the current project is shown in Fig.1. and 2. The first step is choosing the appropriate fake news dataset from kaggle.com and preprocessing the dataset. After that, TF-IDF for extracting word features after splitting the dataset using cross-validation (10-Fold) is applied. The next step is to classify the dataset using Random Forest classifiers and evaluate model performance using different metrics like (accuracy, recall, and precision)[5].

III. SYSTEM ANALYSIS

E-Commerce Website

In this module develop an e-commerce website, that allows you to buy and sell tangible goods, digital products or services online and integrate the F2RSpot API to test the reviews whether the review is genuine or fake.

F2RSpot API

In this module developed the web application fake review and reviewer analytics on amazon consumer demographic and product review data[6].

Fake Review Classification

1. Amazon Review Dataset

We used product review data from Kaggle. The dataset in consisted of two labels, positive and negative, while was composed of three labels of positive, neutral, and negative.

1. Preprocessing

In this module Preprocessing was carried out to modify the text data appropriately in the experiment. We used decapitalization and did not mark the start and end of the sentences. The system deleted #, two or more spaces, tabs, Retweets (RT), and stop words. Convert text to vectors, our classifier only takes numerical data.

2. Feature Extraction

Tfidf (Term Freuency and Inverse Document Frequency) Vectoriser from sklearn module to transform the matrix into a tf-idf representation. This is representation is commonly used in document classification and information retrieval. Sentiment score classification[7].

3. RF Classification

A random forest is a meta estimator that fits a number of decision tree classifiers on various sub-samples of the dataset and uses averaging to improve the predictive accuracy and control over-fitting. To build a Random Forest Classifier instance and then train it on our training subset and then evaluate itover our test subset. And then make a confusion matrix using the heatmap function from seaborn.

Fake Review Prediction

In this module, user login to the E – Commerce sites, purchase or not purchase products andprovide reviews about the products. And those reviews are tested for fake contents with the Amazon review datasets that has been trained[8].

Fake Review Elimination

In this module the fake review are eliminated by simply mailing to the account holder of e-commerce website to whom they didn't buy product but had post reviews.

Fake Review Prevention

- **Review ID Generation System**

To post a review for the purchased product, each customer has been provided with an unique review ID(BoughtAuth Technique that use Genuine Reviewer Protocol by generating review id for bought product) while purchasing. With those ID the customer can post their reviews regarding the purchased products.

- **Review ID Issue**

Review ID issued to the buyers email. By providing such ID's the administrator can avoid unwanted negative or sarcastic reviews and statements from unauthorized customers for their products[9]. So that in future new customers can gain actual and exact reviews for the products that are in the E-Commerce sites such as Amazon, Flipkart, Snapdeal etc.

Performance Evaluation

- Precision, the ratio of the sum of true positive (TP) to true positive (TP) and false-positive cases (FP).

$$Precision = \frac{TP}{TP + FP}$$

- Recall the ratio of the sum of true positive (TP) to true positive (TP) and false-negative cases (FN).

$$Recall = \frac{TP}{TP + FN}$$

- F1-score is the overall evaluation and weighted average based on precision and recall. "1" represents the best score of "F1", while "0" represents the worst score. The formula is as follows:

$$F1 = \frac{2 \times Precision \times Recall}{Precision + Recall}$$

- Accuracy, the ratio of the number of correctly classified samples to the total number of samples.

$$Accuracy = \frac{TP + tn}{(TP + FP) + (TN + FN)}$$

- AUC (Area under the curve) is an evaluation indicator used for the binary classification model, indicating that a positive sample and a negative sample are randomly selected[10].

$$AUC = \frac{\int_0^1 TPdFP}{(TP + FN)(TN + FP)}$$

IV. RESULT

The proposed system is evaluated on Amazon Electronics Product Review Dataset. This dataset includes 4915 063 reviewers. The reviews are classified into 4; 709 review labeled as real and 1; 144 reviews labeled as fake. Amazon has classified the reviews into genuine and fake. Each instance of the review in the dataset contains the review date, review ID, reviewer ID, product ID, review label and star rating. The statistics of dataset is summarized in Table I. The maximum review length in the data contains 875 word, the minimum review length contains 4 words, the average length of all the reviews is 439:5 word, the total number of tokens of the data is 103052 word, and the number of unique words is 102739 word.

Table :1

No	Model	Accuracy	Precision	Recall	F1 Score
1	Logistic Regression	0.8201	0.82911	0.8201	0.82319
2	Naïve Bayes Classifier	0.73631	0.73331	0.73631	0.74834
3	K-NN	0.71012	0.8288	0.79241	0.79839
4	SVM	0.83148	0.87527	0.84742	0.85236
5	RF	0.95859	0.97684	0.96865	0.98457

V. DIAGRAM

1. SYSTEM ARCHITECTURE

System architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports Reasoning about the structures and behaviours of the system.
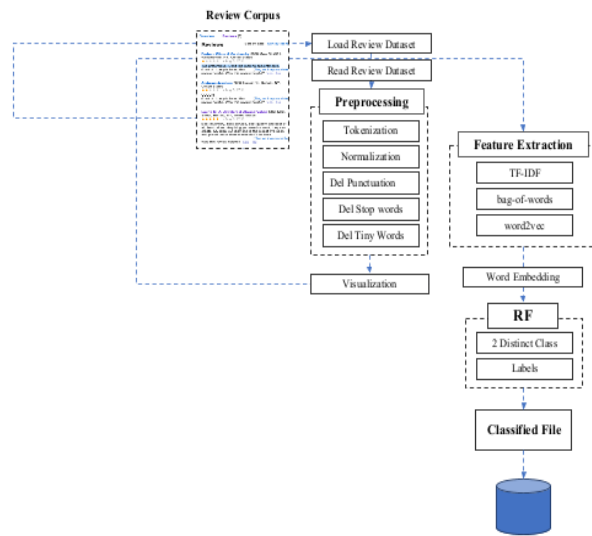
FAKE REVIEW DETECTION

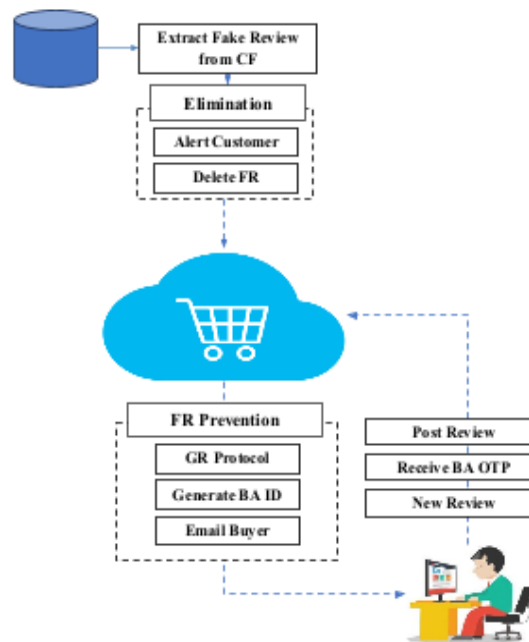Fig.1

FAKE REVIEW ELIMINATION AND PREVENTION

Fig.2

VI. CONCLUSION

Nowadays, when customers want to draw a decision about services or products, reviews

become the main source of their information. Fake reviews may mislead consumers. A large number of fake reviews will even cause huge property losses and public opinion crises. It is obvious that reviews play a crucial role in people's decision. Thus, fake reviews detectio is a vivid and ongoing research area. In this paper, F2RSpot API an ensemble learning algorithm Random Forest based fake reviews detection,elimination and prevention approach is presented. In the proposed approach, both the features of the reviews and the behavioral features of the reviewers are considered. The Amazon dataset is used to evaluate the proposed approach. Experimental results show that this method is more effective than traditional algorithms. It uses unlabeled data to improve the performance of the classification system,and has better classification accuracy. At the same time, the consistency of sentiment and score

is analyzed, and the feature extraction of the review is carried out through the text representation model, and the feature fusion is combined with the external features of the text, which can effectively improve the classification effect of the classification model.

VII. FUTURE ENHANCEMENT

In the future, we will decide to find a more effective and accurate detection method that can detect false information in multiple fields, including fake information, fake news, and rumors. Deep fake detection with the rise of deepfake technology, there is a need to develop algorithms that can identify and flag reviews that are generated using AI-generated text or voice synthesis. This can help identify artificially created reviews that are difficult to distinguish from genuine ones.

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