

# Fake Review Detection using Enhanced Random Forest

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**Abstract**—In the current scenario, the social media demands the growing popularity of any services is entirely based on the huge number of user communications in form of customer comments, reviews and opinions. Therefore, it is highly needed that in any social networks, electronic media or in any services which resides in blogging the generated user communication should be of quality. The fake generation of user communications such as customer comments, reviews, and opinions could mislead the user, whereas the promotion of the product grows to be high. Sentiment Analysis (SA) is introduced to examine the opinions. Usually, sentiment analysis is defined as the area of study to examine people's emotion, reviews, and attitudes from written languages. The primary aim of this work is to develop an automated system, which would process customer fake review. Enhanced Random Forest (ERF) algorithm is proposed for detecting the reviews. The performance of ERF is analyzed by comparing it with the other ML algorithms such as decision tree, Naïve Bayes, SVM, and traditional random forest algorithm. From the experimental results, it is noticed that the proposed ERF algorithm has higher performance ratio and minimum execution time than other ML algorithms.

**Keywords**—Customer Review, Sentiment Analysis, Deep Learning, Enhanced Random Forest, Naïve Bayes and Decision Tree.

## I. INTRODUCTION

The feelings, emotions, thoughts, and ideas about a product are sentiments. Opinion mining and sentiment analysis are basically challenging because NLP [1] in computer extraction, categorizing and summarizing internet opinions are really tough. Sentiment analysis is about a study of variety of firms which is used to identify consumer comments on items. This helps the other users to identify the ideal choices of their preferred item. The submission of false reviews is called Opinion spamming (OS). Opinion spamming (OS) is used to mislead readers. The major goal of a spammer is to create a false reputation. It can either be good or bad. Companies highly use this for by posting false reviews. Some firms hire spammers for advertising their company to attract new

clients. This can also be used to demote the contemporaries in the same industry. There are two reviews: Positive Polarity & Negative Polarity. The reviews express the compliments of the product are called Positive polarity [2].

The reviews which feature the unfavorable statements about the product are classified under Negative polarity. There are more reasons to create fake reviews, the major among the two are: Human generated way and computer-generated way. In Human generated ways human write whereas in computer generation algorithms automate the fake review creation. The unorganized and unstructured texts are classified with sentiment analysis. Fig. 1 shows system methodology.

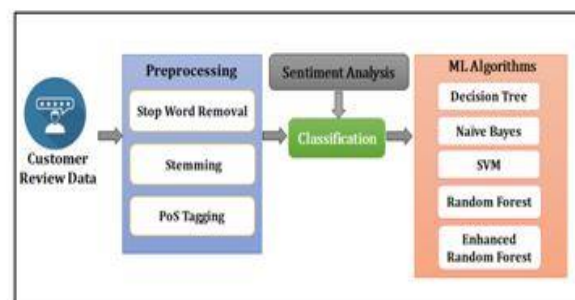


Fig. 1. System Methodology.

The systems using sentiment analysis are used by the organizations to gather the information insights. Usually these unorganized and unstructured texts come up from online sources. The major reviewing platforms like emails, blog posts, support tickets, web chats, social media channels, forums and comments are the sources of fake reviewing policies. Deep Learning Algorithms [3][4] plays a very important role in identifying the major insights in the sentiment analysis. By using the different algorithms, they replace the manual data pre-processing techniques (since they are big) by implementing rule-based, automatic or hybrid methods. The basic idea of Rule-based systems

is to perform analysis by predefined and lexicon-based rules. The machine learning techniques implement automatic systems which learn and imply from the data and the output is decided based on the learning data and algorithm. A hybrid sentiment analysis is an analysis which combines two approaches. Deep learning (DL) is considered an evolution in machine learning. Deep Learning adds all the algorithms which aims to simulate the human brain, a neural network simulation. Artificial Neural Network applies automation and Intelligence in opinion. Opinion Mining chains the algorithm together to simulate and identify the fake accounts and comments chaining it.

## II. RELATED WORKS

In [1], researchers reviewed the existence of millions of objects. The objects include companies, products and service providers. The manual methods include the scale which do not assess for such a volume of reviews. The objects are widely accessed to find the similarity and dissimilarity among the comments given in the different products, services & ratings. The comparison among these will analyze the trustworthiness of the user. Here the data would be big and the manual scaling would be the greatest challenge to face.

In [2], researchers investigated that humans can get away with the assess of the trustworthiness of an online review and identified the factors. Support Vector Machines are used here to assess the volume of reviews. The Hyper plane plot gives you the chances of analyzing the maximum margin, support vectors, positive hyper plane and negative hyper plane. The data gives complex decision scenarios with high dimensional data.

In [3], researchers built a multinomial Naive Bayes algorithm opinion classifier which combines N-grams and POS-labels into the system. They Used dataset from Twitter API and used emoji's to explain the messages. The parameter estimation gives the probability of the accuracy given by the algorithm  $P(\text{Feature}|\text{Classi})$ .

In [4], researchers used a group system for the classification of sentiments. This development is used to combine several capabilities and characterization approaches. This results obtained is more accurate. The technique used here is Recurrent Neural Networks (RNN) which uses deep learning technology along with the echo state and Turing techniques.

In [5], a significant attribute for categorization is one with a higher weight value. As a result, a method was devised for determining the relevant qualities. Bidirectional RNNs are used here to find the accuracy, forward and backward direction RNN are used to capture the past and future long sequence context. The major disadvantage is slower training and is having difficulty in parallelization.

In [6], researchers discovered a 3-way model for classifying public opinion into 3 categories: positively biased, negatively biased, and neutral. Different models were examined, in which they used a tree-based model to represent tweets. Decision tree based models are used here to find the accuracy of the prediction; the feature

extraction technique in this technique classifies the 3 categories and provides a solution. The hierarchical representation is very hard to represent and interpret.

TABLE I. PERFORMANCE ANALYSIS OF DIFFERENT ALGORITHMS

Dataset	Deep Learning Algorithms	Accuracy	Sensitivity	Specificity
Customer Review Dataset	Decision Tree	89.58	87.09	90.85
	Naive Bayes	90.98	88.99	91.95
	Support Vector	92.78	91.79	93.69
	Deep Random Forest	94.11	93.26	95.43

In [7], researchers found 57% detection accuracy, conditioned by the cues given by the information about fake reviews. Transformer Architecture is used here; some models like Bidirectional Encoder Representations from Transformers and Generative Pre-trained Transformers are used identify the fake reviews. The tasks are classified into different entity recognition and the outputs have been with a limited accuracy.

In [8], researchers bought up the issue of singleton spammers, or fraudulent reviews published by people who do not have a large number of reviews. Singleton spammers may go unnoticed if the quantity of written reviews is used as a signal. Word Embedding analysis is used here to identify the positive, negative and neutral analysis. The analysis is represented as sentiment lexicons, used to calculate the overall sentiment from a piece of text.

In [9], researchers found the number of trees to be integrated (B) into the forests was determined using the equation based on these variables.  $B_0 + B$  and feature vectors  $l()$ , a forest  $l$  is created from scratch. Parsing and syntactic analysis are the contextual analysis done to figure out the linguistic analyses and text processing tasks. Trie structures are used for text processing and the accuracy seemed to be on average limits.

In [10], index analysis, large text corpora analysis and statistical techniques are used for efficient sentiment analysis. The leverage analysis is a combination of regression algorithms, entity recognition and the structured data are tailored together to find the accuracy in the analysis of the comments in the entire media section analysis. The processing techniques include a hybrid translation and recognition technique. The output provided to be in the better value than the other traditional techniques.

## III. PROPOSED METHODOLOGY

In the early stages, the dataset is gathered from several web documents that are considered as inputs for the presented approach. Not properly structured or unsuitable raw input is suitably subjected to the method of pre-processing and the outcome is employed for additional processes. Fig. 2 shows converting sentences to embedding in random forest.