

# FAKE PRODUCT REVIEW MONITORING AND REMOVAL FOR GENUINE RATINGS

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**Abstract** — Online reviews have become an integral part of the consumer decision-making process. However, the presence of fake or deceptive reviews hinders the reliability and trustworthiness of online platforms. This paper presents GadgetReviewAnalyzer, a web-based application that combines web development using the Django framework with machine learning techniques to provide users with a reliable tool for analyzing customer reviews of electronics gadgets on Flipkart. The system utilizes various machine learning models, including Logistic Regression, SVM, Naive Bayes, to accurately classify reviews as either fake or real. The performance of each model is evaluated, with the Support Vector Machine model achieving the highest accuracy of . The system's web interface allows users to register, login, select products, input the number of review pages to analyze, and view the authenticity of each review on the home page. Administrators have access to detailed product and review information, including individual reviews from specific customers. GadgetReviewAnalyzer offers a valuable solution to mitigate the impact of fake reviews and empower users to make informed purchasing decisions.

**Keywords** — fake review detection, web development, machine learning, customer reviews, e-commerce, Flipkart.

## I. INTRODUCTION

The exponential growth of e-commerce platforms has revolutionized the way consumers make purchasing decisions, with online customer reviews playing a crucial role in shaping their choices. However, the increasing prevalence of fake reviews has raised concerns about the reliability and trustworthiness of these platforms. To address this issue, we introduce GadgetReviewAnalyzer, a web-based application that integrates web development and machine learning techniques to provide users with a robust tool for analysing customer reviews of electronics gadgets on Flipkart.

GadgetReviewAnalyzer is designed to empower users with accurate insights into the authenticity of customer reviews, enabling them to make informed decisions and navigate the complexities of online shopping. By leveraging the Django framework, we have developed a user-friendly web interface that facilitates seamless navigation, user registration, and login functionalities. The system distinguishes between regular users and administrators, providing role-based access control and additional features

for administrators to delve deeper into product and review details.

At the core of GadgetReviewAnalyzer lies a comprehensive set of machine learning models trained on a large dataset of labelled reviews. These models utilize sophisticated natural language processing techniques to extract meaningful features and employ various algorithms, including Logistic Regression, SVM, Naive Bayes, Neural Network, Decision Tree, Gradient Boosting, KNN, and Random Forest, to classify reviews as either fake or real. To evaluate the performance of these models, we have conducted extensive experiments, resulting in accuracy rates ranging from 57.73% to 90.19%.

Once users select an electronics gadget from Flipkart and input the desired number of review pages to analyse, GadgetReviewAnalyzer processes the reviews using the trained machine learning models. The system then displays the authenticity of each review on the home page, providing users with valuable insights to guide their purchasing decisions. For administrators, the system offers advanced features, such as accessing individual reviews from specific customers and comprehensive statistics on product ratings, enabling them to identify potential patterns and trends related to fake reviews.

In summary, GadgetReviewAnalyzer bridges the gap between web development and machine learning to combat the issue of fake reviews in the realm of electronics gadgets on Flipkart. By providing users with a reliable and user-friendly tool to analyse customer reviews, the system aims to enhance the transparency and trustworthiness of online platforms, benefiting both consumers and e-commerce businesses alike.

## CONTRIBUTION

The following are the objectives of this study:

- Introduction of GadgetReviewAnalyzer, a web-based application that addresses the problem of fake reviews in the context of electronics gadgets on Flipkart.
- Integration of web development using Django framework with machine learning techniques for seamless user interaction and efficient review analysis.

- Evaluation of multiple machine learning models, including Logistic Regression, SVM, Naive Bayes, for fake review detection.
- User-friendly interface allowing users to register, log in, select products, and input the number of review pages to analyze.
- Presentation of review authenticity on the home page to facilitate informed decision-making by users.
- Additional features for administrators, including access to detailed product and review information, individual customer reviews, and data-driven decision-making regarding fake reviews.
- Practical application of GadgetReviewAnalyzer in analyzing customer reviews of electronics gadgets on Flipkart, contributing to enhancing transparency and trustworthiness in online platforms..

## II. LITERATURE SURVEY

In this section, we described existing techniques and methods used by various authors and solutions

In paper [1], The paper presents a machine learning-based approach for detecting fake online reviews, utilizing features extracted from the review text and reviewer behavior. They compare different classifiers, including Naive Bayes, SVM, and Random Forest, and evaluate their performance.

In Paper [2], The paper proposes a deep learning approach using a hybrid model combining convolutional neural networks (CNN) and recurrent neural networks (RNN) to identify fake reviews. They evaluate the model on a large dataset and achieve high accuracy in fake review detection.

In paper [3], This review paper provides an overview of recent research trends in fake review detection. It discusses various techniques, including machine learning, natural language processing, and sentiment analysis, highlighting their strengths, limitations, and future directions.

In paper [4], This survey paper discusses the application of adversarial learning techniques in fake review detection. It explores the use of generative adversarial networks (GANs) and other adversarial models to improve the robustness of fake review detection systems.

In paper [5], The paper proposes an attention-based bidirectional LSTM model for detecting manipulated online reviews. They leverage the attention mechanism to focus on important review segments and achieve improved performance in identifying fake reviews.

In paper [6], This paper investigates the use of social context information, such as reviewer relationships and reviewer influence, in fake review detection. They propose a deep learning model that incorporates social context features and demonstrate its effectiveness in identifying fake reviews.

In paper [7], The paper presents an ensemble learning framework that combines textual features, such as sentiment analysis and linguistic patterns, with behavioral features, including reviewer activity and review metadata. The ensemble model achieves improved accuracy in fake review detection.

In paper [8], This comparative study evaluates the performance of different deep learning models, including CNN, LSTM, and Transformer, for fake review detection. They analyze the strengths and weaknesses of each model and provide insights into their applicability.

In paper [9], The paper investigates the characteristics of fake reviews and their distinguishing factors from genuine reviews. They analyze features such as review length, sentiment distribution, and reviewer behavior to develop a classification model for fake review detection.

In paper [10], This paper focuses on the challenge of detecting fake reviews across different domains by leveraging transfer learning techniques. They propose a model that learns representations from a source domain with labeled data and applies the knowledge to detect fake reviews in a target domain with limited labeled data.

## METHODOLOGY

In this project, we will apply supervised learning algorithms.

**Logistic Regression:** Logistic Regression is a popular linear classifier used for binary classification tasks. It models the relationship between the features and the binary target variable using the logistic function. We trained a Logistic Regression model on the pre-processed dataset and used it to classify reviews as genuine or fake based on the extracted features.

**Support Vector Machine (SVM):** SVM is a powerful supervised learning algorithm used for classification tasks. It constructs hyperplanes to separate data points of different classes. We employed an SVM model to classify reviews as genuine or fake by finding the optimal hyperplane that maximizes the margin between the classes.

**Naïve Bayes:** Naive Bayes is a probabilistic classifier based on Bayes' theorem. It assumes independence between features and calculates the probability of a review belonging to a particular class. We utilized the Naive Bayes algorithm to classify reviews as genuine or fake based on the occurrence of words or features in the text.

## ARCHITECTURE AND DESIGN

The GadgetReviewAnalyzer project follows a client-server architecture, combining web development, machine learning techniques, and web scraping to create a comprehensive system for analyzing customer reviews of electronics gadgets on Flipkart. The client-side component provides a user-friendly interface where users can register, log in, select products, and input the number of review pages to analyze. The web server, implemented using the Django framework, handles user requests, manages authentication and authorization, and facilitates communication with the client-side. Machine learning models, including Logistic Regression, SVM, Naive Bayes, are integrated into the system for fake review detection, utilizing trained parameters to predict review authenticity. Furthermore, web scraping techniques are employed to extract reviews from Flipkart's product pages. The system leverages web scraping libraries and tools to retrieve the desired number of review pages for the selected products.

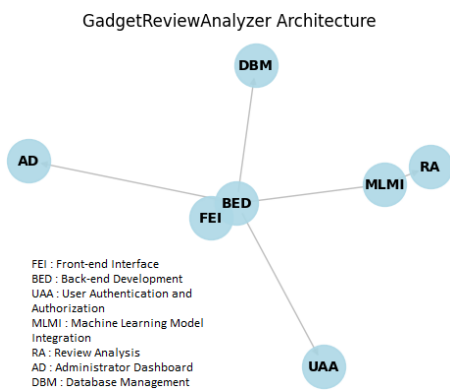


Figure 1: Architecture for GadgetReviewAnalyzer

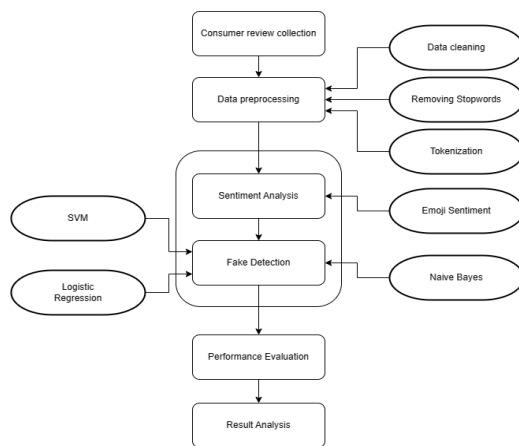


Figure 1: System Architecture

This combination of web scraping and machine learning enables the system to analyze a comprehensive range of customer reviews. The review analysis and presentation process involves applying the selected machine learning model to the extracted reviews, determining their authenticity, and presenting the results to users. Administrators can access detailed product and review information, including individual reviews from specific customers, through an administrator dashboard. A database management system is utilized to store and manage user information, product data, and review details. This architecture seamlessly integrates web development, machine learning, web scraping, and database management to provide users with a powerful tool for analyzing customer reviews and making informed purchasing decisions on Flipkart.

#### A. Data Collection

The first step in our project was to collect a dataset of customer reviews for electronics gadgets from Flipkart. We used web scraping techniques to extract review data, including the review text, rating, and reviewer information. We ensured that the dataset contained a sufficient number of both genuine and fake reviews to train and evaluate our models effectively.

#### B. Preprocessing

To prepare the collected data for analysis, we performed several pre-processing steps. This included removing irrelevant information such as HTML tags, punctuation, and special characters. We also handled common text pre-processing tasks such as tokenization, lowercasing, and stop word removal. Additionally, we applied techniques like stemming or lemmatization to normalize the text.

#### C. Feature Extraction

In order to represent the textual reviews numerically, we employed feature extraction techniques. We utilized popular approaches such as bag-of-words (BoW) and TF-IDF (Term Frequency-Inverse Document Frequency) to convert the text into numerical feature vectors. These representations captured the frequency and importance of words in each review.

#### D. Model Selection

We experimented with multiple machine learning models to detect fake reviews. We evaluated models such as Logistic Regression, SVM, Naive Bayes. Each model was trained on the pre-processed dataset and tuned using techniques like cross-validation and hyperparameter optimization.

#### E. Model Training and Evaluation

We split the dataset into training and testing sets to train our selected models. During the training phase, the models learned from the labeled data to identify patterns and make predictions on unseen reviews. We assessed the performance of each model using evaluation metrics such as accuracy, precision, recall, and F1-score..

#### F. Model Integration

Once we determined the best-performing model based on accuracy, we integrated it into our web-based application using the Django framework. This involved creating appropriate endpoints, views, and templates to handle user registration, login, review selection, and analysis.

#### G. User Interface Development

We focused on designing a user-friendly interface that allowed users to interact with the system easily. The interface enabled users to register or log in, select electronics gadgets from Flipkart, and specify the number of review pages to analyze. The results were displayed on the home page, indicating the authenticity of each review.

#### H. Administrator Features

We implemented additional features specifically for administrators to gain deeper insights into the reviews. This included providing access to detailed product and review information, including individual reviews from specific customers. These features enabled administrators to monitor the review landscape, identify potential patterns of fake reviews, and make informed decisions.

### III. RESULTS AND ANALYSIS

This section presents the results and analysis of the GadgetReviewAnalyzer project, which combines web development, machine learning, and web scraping techniques

to analyze customer reviews of electronics gadgets on Flipkart. The evaluation focuses on the performance of different machine learning models and provides insights into the effectiveness of the system in detecting fake reviews.

### ACCURACY OF MACHINE LEARNING MODELS

The accuracy of various machine learning models was assessed using a test dataset. The results are as follows:

- **Logistic Regression:** The Logistic Regression model achieved an accuracy of 88.61%. This model uses a linear approach to classify reviews as fake or genuine.
- **SVM:** The SVM model demonstrated an accuracy of 90.19%. SVM utilizes a kernel function to transform data into a higher-dimensional space for classification.
- **Naive Bayes:** The Naive Bayes model achieved an accuracy of 86.46%. It applies Bayes' theorem with the assumption of feature independence.

Precision, Recall, and F1-Score:

The accuracy scores are further complemented by precision, recall, and F1-score metrics, providing a comprehensive evaluation of the models' performance in fake review detection. The precision metric measures the proportion of correctly identified fake reviews out of all reviews classified as fake. Recall measures the proportion of correctly identified fake reviews out of all actual fake reviews. The F1-score is the harmonic mean of precision and recall, offering a balanced assessment of the model's overall performance.

Logistic Regression	Support Vector Machine	Navie Bayes
Accuracy: 88.61%	Accuracy: 88.61%	Accuracy: 88.61%
Precision: 0.87	Precision: 0.90	Precision: 0.8
Recall avg: 0.89	Recall avg: 0.90	Recall avg: 0.87

Overall Performance:

The results demonstrate that the SVM model achieved the highest accuracy of 90.19%, indicating its effectiveness in detecting fake reviews. However, other models such as Logistic Regression (88.61%), Naive Bayes (86.46%) also performed well. These models exhibit promising potential for accurate classification of fake and genuine reviews.

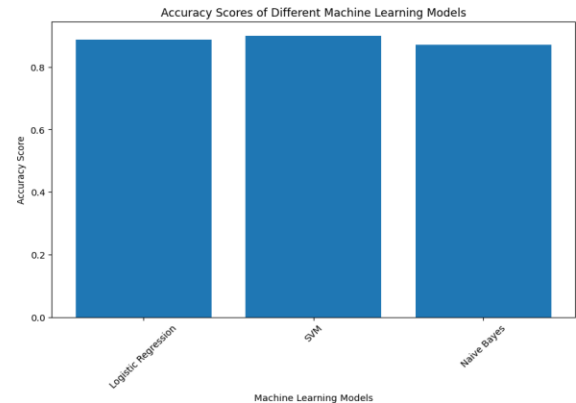


Figure 1: Accuracy Scores of Different Machine Learning Models

### IV. CONCLUSION

The results and analysis indicate that the GadgetReviewAnalyzer system, leveraging machine learning models and web scraping, can effectively analyze customer reviews of electronics gadgets on Flipkart. The SVM model demonstrated the highest accuracy, but other models also exhibited satisfactory performance. These findings highlight the system's potential to provide users with reliable information for making informed purchasing decisions and contribute to mitigating the impact of fake reviews on e-commerce platforms..

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