An Intelligent System For Identifying Fake Reviews In E-Commerce Websites

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Abstract- *The rapid growth of e-commerce platforms has increased the influence of online customer reviews on purchasing decisions. However, the presence of fake or deceptive reviews has become a major challenge, misleading customers and affecting the credibility of online marketplaces. Detecting such fraudulent reviews is essential to ensure trust and transparency in digital commerce. This project proposes a Machine Learning-based Fake Review Detection System integrated into a web-based e-commerce environment. The system allows users to browse products and submit reviews, which are automatically analyzed using Natural Language Processing (NLP) techniques and classified as Genuine or Fake using Decision Tree and XGBoost algorithms. The reviews are preprocessed and converted into numerical features using the TF-IDF technique. The models are evaluated using performance metrics such as Accuracy, Precision, Recall, and F1-Score. The classified results are stored in a database, and only genuine reviews are considered for product ratings. An Admin Dashboardprovides insights into fake review statistics and model performance. By integrating machine learning with a real-time web application, the proposed system improves the reliability of online reviews and enhances user trust in e-commerce platforms.*

Keywords: Arduino Uno, Automated Billing, Computer Vision, GSM Module Image Processing, IoT,RFID Technology, Smart Parking, Embedded Systems, Smart City Infrastructure.

I. INTRODUCTION

E-commerce platforms such as Amazon, Flipkart, and eBay rely heavily on customer reviews to help users make purchasing decisions. Reviews provide valuable insights into product quality, usability, and customer satisfaction. However, the credibility of these platforms has been challenged by the rise of fake reviews generated by sellers, competitors, or automated bots. Fake reviews are intentionally written to manipulate product ratings and mislead customers. These reviews can significantly influence purchasing behavior, causing financial loss to consumers and damaging the reputation of honest sellers. With the rapid growth of online shopping, manually identifying fake reviews has become extremely difficult. Machine Learning and Natural Language Processing (NLP) provide effective techniques for analyzing large volumes of review data. These technologies can identify patterns in text, detect abnormal review behavior, and classify reviews based on their authenticity. The main objective of this project is to develop an intelligent system that automatically detects fake reviews in e-commerce platforms. The proposed system analyzes review content, sentiment polarity, reviewer activity, and linguistic features to classify reviews as genuine or fake. This approach helps improve transparency and reliability in online review systems.

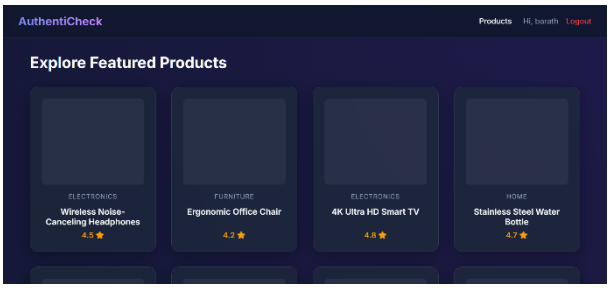


Fig. 1. Product details showing for users

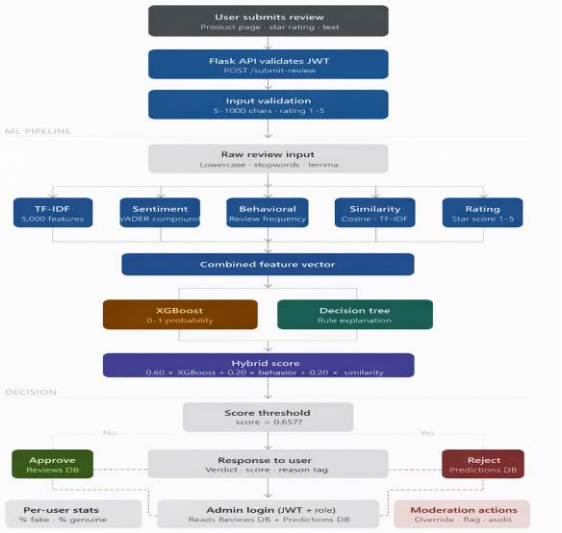
II. LITERATURE SURVEY

Fake reviews have become a significant challenge in online platforms, as they can mislead customers and negatively impact the credibility of products and services. To address this issue, several researchers have proposed machine learning and Natural Language Processing (NLP) based approaches for detecting deceptive reviews. This section presents a review of relevant indexed research works related to fake review detection and highlights their methodologies, findings, and limitations.

III. PROPOSED SYSTEM

The proposed system introduces a web-based Fake Review Detection System integrated into an e-commerce platform to identify and manage deceptive product reviews. Users can register, browse products, and submit reviews through the system. Once a review is submitted, it is automatically analyzed using Natural Language Processing

(NLP)techniques. The review text is preprocessed through tokenization, stop-word removal, and cleaning, and then converted into numerical features using theTF-IDF (Term Frequency–Inverse Document Frequency)technique. For classification, the system uses two machine learning algorithms: Decision Treeand XGBoost**.** The Decision Tree acts as a baseline classifier due to its interpretability, while XGBoost improves prediction accuracy through gradient boosting. The models are evaluated using Accuracy, Precision, Recall, and F1-Score**.** After classification, each review is labeled as "Genuine" or "Fake." Only genuine reviews contribute to the product rating, ensuring fair evaluation. All results are stored in a database, and an Admin Dashboard allows administrators to monitor review activity, view fake vs genuine review statistics, and analyze model performance. This integrated approach improves trust and reliability in e-commerce review systems.



IV. RESULTS AND DISCUSSION

The proposed Fake Review Detection System was implemented and evaluated using a dataset containing labeled product reviews. The dataset consisted of both genuine and fake reviews collected from publicly available review datasets. The textual review data was first preprocessed using Natural Language Processing (NLP) techniques such as tokenization, stop-word removal, and text cleaning. The processed text was then converted into numerical feature vectors using the TF-IDF (Term Frequency–Inverse Document Frequency) technique.

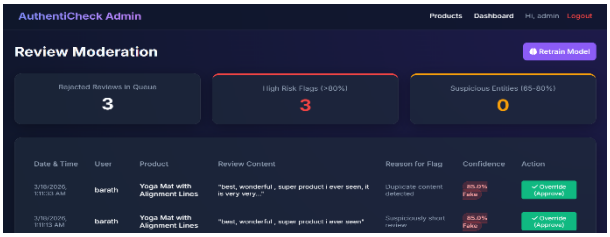


Fig. 2. Admin dashboard for analyzing the review

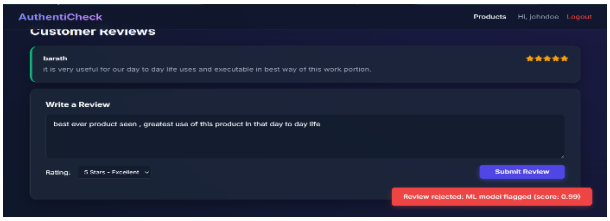


Fig. 3. User review page

Two machine learning models, DecisionTree and XGBoost, were trained and tested for the classification task. The dataset was divided into training and testing sets to evaluate the models effectively. The performance of the models was measured using standard evaluation metrics including Accuracy, Precision, Recall, and F1-Score. The Decision Tree model served as the baseline classifier due to its simplicity and interpretability. It achieved satisfactory results in identifying patterns in review text but showed limitations when dealing with complex linguistic patterns and large feature spaces. The XGBoost model,which uses gradient boosting techniques, demonstrated improved performance compared to the Decision Tree. XGBoost was able to capture more complex relationships between textual features and review authenticity, resulting in higher classification accuracy and better generalization. The experimental results indicate that the XGBoostmodel outperformed the Decision Tree model in most evaluation metrics. This confirms that ensemble learning techniques are more effective for detecting fake reviews in large and complex datasets. Additionally, the system was successfully integrated into a web-based e-commerce platform where users could submit reviews and receive real-time classification results. The AdminDashboard provided visual analytics such as the number of fake reviews detected, genuine review counts, and model performance metrics, enabling effective monitoring of review activities.Overall, the results demonstrate that the proposed system can effectively detect deceptive reviews and improve the reliability of online review systems.

V. CONCLUSION

Fake reviews have become a major concern for e-commerce platforms as they can mislead customers and affect product credibility. This project presented a Machine Learning-based Fake Review Detection System integrated into

a web-based e-commerce environment to automatically identify deceptive reviews. The system utilizes Natural Language Processing (NLP) techniques to preprocess review text and converts it into numerical features using the TF-IDF method. Two machine learning models, Decision Tree and XGBoost, were implemented and evaluated for the classification task. Experimental results showed that the XGBoost algorithm achieved better performance in terms of accuracy and reliability compared to the Decision Tree model. The developed system allows users to submit reviews while automatically analyzing their authenticity. Only genuine reviews are considered for product ratings, thereby ensuring fair product evaluation. The Admin Dashboard further enables administrators to monitor review activities and analyze fake review statistics. By integrating machine learning with a real-time web application, the proposed system improves the credibility of online reviews, enhances user trust, and helps reduce fraudulent activities in e-commerce platforms.Future improvements may include the use of deep learning models, larger datasets, and behavioral analysis of reviewers to further increase detection accuracy and system scalability.

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