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International Journal of Advanced Research in Computer Science Engineering and Information Technology

Volume: 6, Issue: 3,Special Issue: 3 ,Apr,2025 ,ISSN_NO: 2321-3337

DECENTRALIZED E-COMMERCE REVIEW AND SENTIMENT ANALYSIS PLATFORM LEVERAGING BLOCKCHAIN FOR ENHANCED TRANSPARENCY AND CUSTOMER INSIGHTS

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Abstract –The E-commerce Website is a comprehensive software designed to streamline the review and sentiment analysis of the customer insights. It involves two e-commerce websites, each with its own web application. Customers can browse, purchase, and review products, while product owners can view reviews from both sites in one place. Admins are responsible for authenticating users and product owners. To ensure security and transparency for product uploads, providing an immutable record that verifies authenticity and prevents unauthorized modifications by using Blockchain technology. Customers can check product details on the blockchain, enhancing trust in their purchases. Further sentiment analysis categorizes reviews as positive or negative helping customers make informed decisions and enabling product owners to analyse customer feedback. This system allows product owners to compare reviews across both platforms, identify trends, and gain valuable insights into customer perception, ultimately improving transparency, security, and trust in e-commerce interaction [1].

Keywords: Authentication, Blockchain, Transparency, Sentimental analysis,

1. INTRODUCTION

Electronic commerce (e-commerce) refers to the buying and selling of goods and services over the internet. It enables businesses and consumers to conduct transactions online, eliminating geographical barriers and offering convenience and speed. E-commerce transactions can occur through various digital platforms such as websites, smartphone applications, social media platforms, and online marketplaces like Amazon, Flipkart, eBay, and others.

Modern e-commerce platforms typically include a range of essential features that enhance the shopping experience and streamline business operations. These features include comprehensive product catalogs with detailed descriptions and high-quality images, real-time pricing information, customer reviews and ratings, secure payment gateways, order tracking systems, customer accounts, and personalized recommendations based on user behavior and preferences for purchase of the need products for their review insights of different systematic approach [3].

In today's competitive digital marketplace, customer reviews play a pivotal role in influencing purchasing decisions and shaping the reputation of products and brands.

Positive reviews can boost consumer trust and drive sales, while negative reviews can deter potential buyers. As a result, managing and analysing reviews across multiple e-commerce platforms has become increasingly important for product owners, sellers, and businesses. However, this task can be challenging due to the volume, diversity, and unstructured nature of the review data [4].

2. METHODOLOGY

The system integrates Blockchain technology and Sentiment Analysis to provide a secure, transparent, and intelligent e-commerce experience. When a customer places an order, key transaction details such as order ID, buyer ID, product ID, timestamp, and amount are securely stored as key-value pairs on a blockchain ledger [2]. This ensures every transaction is immutable, tamper-proof, and traceable. Blockchain eliminates dependency on centralized systems by using decentralized nodes for validation, enhancing data integrity and building trust among users. Once stored, transaction data cannot be altered or deleted, providing a transparent and permanent order history for both customers and sellers [4].

In parallel, the system performs sentiment analysis on customer reviews submitted after product purchase. Reviews are posted from the exact purchase location, improving authenticity and trust in feedback. Each review is analysed using Classifier algorithm techniques: Support Vector Machine (SVM**)** for classification based on patterns which rely on sentiment dictionaries to assign polarity scores. The reviews are then classified into positive or negative sentiment categories [3]. To provide deeper insight, aspect-based sentiment analysis identifies key elements within each review, such as product quality, delivery service, and pricing, assigning weighted influence based on their relevance to the customer experience The combination of blockchain's secure, traceable transaction system and sentiment analysis's intelligent feedback processing results in a comprehensive platform that enables secure transactions, meaningful review insights, and informed decision-making by product owner.

3. DATA FLOW DIAGRAM

The interaction process for Product Owners and Buyers. Product Owners register, get login approval, log in, add products, and view website reviews. Buyers register, get login approval, log in, buy products, and give reviews after purchase. Both roles are part of a structured system with step-by-step access and actions. Only after buying a product can a Buyer submit a review. These reviews are visible to the Product Owners along with the website feedback for the usage of the product being purchased.

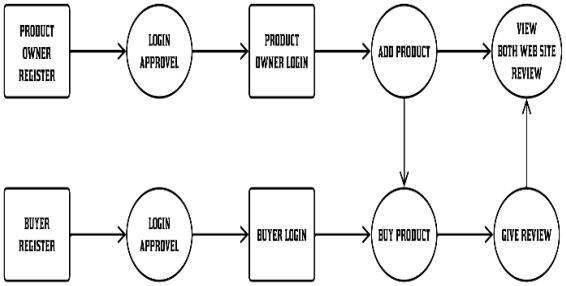

Fig 3 Data Flow Diagram

4. PROPOSED SYSTEM

To develop two integrated e-commerce websites that enable customers to seamlessly purchase and review products. These platforms will not only support standard e-commerce functionalities such as product browsing, secure login, and checkout processes, but will also introduce a unified system for collecting and analysing customer feedback [4]. Product Owners will have the unique capability to view aggregated reviews from both websites in a centralized dashboard, providing a comprehensive and comparative overview of product sentiment across platforms.

A key feature of the system is the implementation of sentiment analysis on customer reviews. By leveraging Support Vector Machine (SVM) the system will automatically determine whether reviews express positive or negative sentiments [3]. This functionality empowers both Product Owners and customers with meaningful insights into how a product is being perceived in the market, beyond basic star ratings or raw text feedback.
This dual-platform system aims to enhance transparency and trust between sellers and buyers, support informed purchasing decisions, and enable product owners to make data-driven improvements. The websites will be designed with a focus on user experience, ensuring they are intuitive, responsive, and easy to navigate for users of all levels. The system will be built to scale, capable of handling high traffic volumes and large datasets efficiently, ensuring consistent performance as user engagement grows.

Support Vector Machine (SVM) is a powerful supervised learning algorithm used for binary classification tasks, such as determining whether a text review is positive or negative. In sentiment analysis, it takes in pre-processed text data and transforms it into numerical feature vectors using methods like Bag of Words. These vectors represent the importance of words in the context of the dataset [3].

The Support Vector Machine (SVM) algorithm then learns to find an optimal hyperplane that best separates the positive reviews from the negative ones. It maximizes the margin between the closest data points from each class, known as support vectors, ensuring a robust decision boundary [4].
Once trained, it can classify new reviews by checking which side of the hyperplane they fall on. If the input vector lies on the positive side, it is labelled as a positive review; otherwise, it is labelled as negative.

Support Vector Machine (SVM) performs well on high-dimensional data like text, handles sparse inputs effectively, and often gives better accuracy than simple models. However, it does not provide probability scores by default and may require more computational resources for large datasets.

Score	Reviews
Greater than 0	Positive
Less than zero	Negative

Table 4.1 Support Vector Machine (SVM) Analysis

Disadvantage: Creating two e-commerce websites with web applications, implementing sentiment analysis, and ensuring the website is user-friendly, secure, and scalable may require a significant initial investment.

Developing and maintaining the proposed system may require technical expertise, which may not be readily available in-house. This could result in additional costs related to outsourcing or hiring technical staff.

Advantage: Product owners to view reviews on both e-commerce websites in one place, the proposed system provides a more comprehensive view of product sentiment. This can help product owners to understand how their products are being received and improve them based on customer feedback [5]

With sentiment analysis applied to customer reviews, the proposed system can provide a transparency understanding of customer feedback. This can help product owners to make Scalable, informed decisions and address potential issues promptly [6]

5.1 ADMINISTRATOR MODULE

The Sellers and buyers will register on the website by providing details like username, password, contact, and email.
After registration, the admin will verify and approve the user information. This ensures that only legitimate users access the system and prevents fake accounts [8]. Approved users can then access their respective features on the platform. The registration process is simple, secure, and helps maintain the integrity of the system.

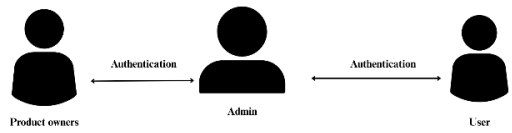

Fig 5.1 Administrator Module

5.2 PRODUCT MANAGEMENT MODULE

This module allows product owners to add, update, or remove products by entering details like name, description, price, and images. They can view customer reviews from both websites in one place, to track feedback easily [5]. This unified review system helps product owners track real-time feedback, understand customer perception, and improve product quality. This module empowers product owners with the tools to manage their offerings effectively and make data-driven decisions.

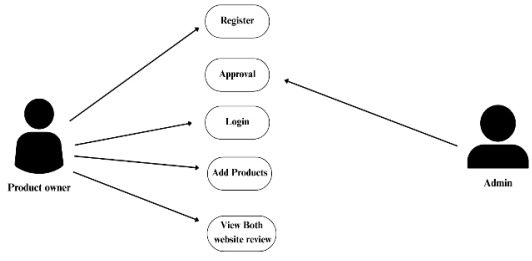

Fig 5.2 Product Management Module

5.3 CONSUMER MODULE

In this module Consumers buy the product and leave a review as product feedback at the exact location where the product was purchased.
Document-level sentiment classification identifies the overall opinion in the review, even if it includes mixed views on various product aspects.
By making reviews of these important aspects, the system improves sentiment accuracy and better reflects the consumer's true experience.

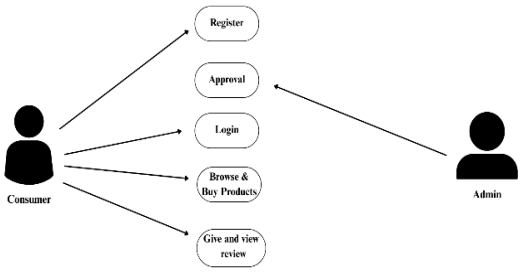

Fig 5.3 Consumer Module

5.4 SENTIMENTAL CLASSIFICATION MODULE

The Classifier algorithm-based approach uses predefined sentiment words, phrases, and idioms to determine sentiment Supervised learning approaches like Support Vector machine (SVM) used to train sentiment classifiers effectively supervised learning methods are labour-intensive due to the need for time-consuming and accurate labelling of training data [4].

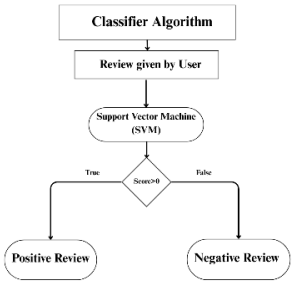

Fig 5.4 Sentimental Classification Module

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Volume: 6, Issue: 3,Special Issue: 3 ,Apr,2025 ,ISSN_NO: 2321-3337

6. EXPERIMENTAL RESULTS

This result discusses the implementation of the decentralized e-commerce review and sentiment analysis the below Fig. 6.1., Fig. 6.2. and Fig. 6.3 Shows the implementation blockchain for enhanced transparency and customer insights.

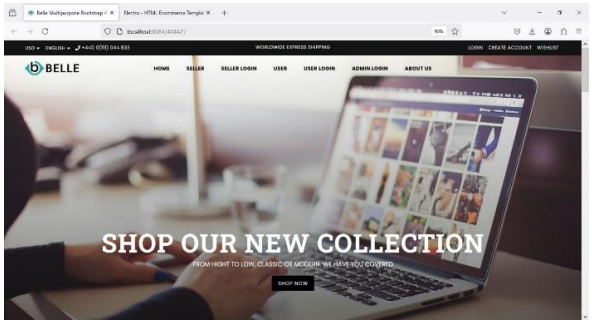

Fig.6.1. Home page 1

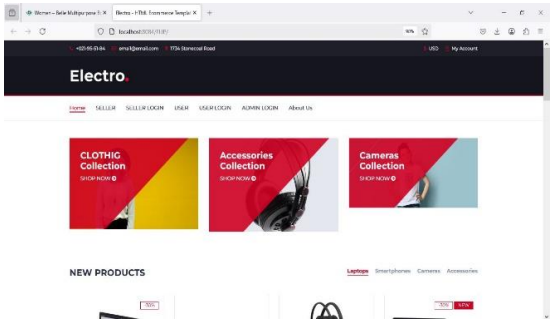

Fig 6.2 Home page 2

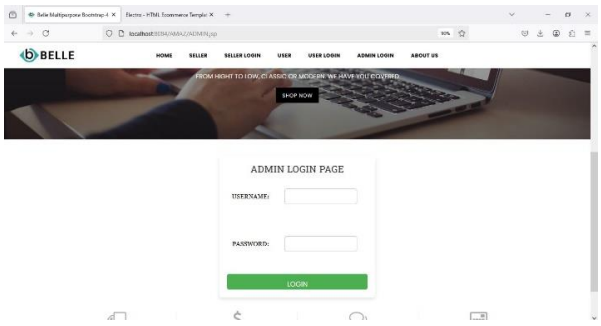

Fig 6.3 Admin Login Page

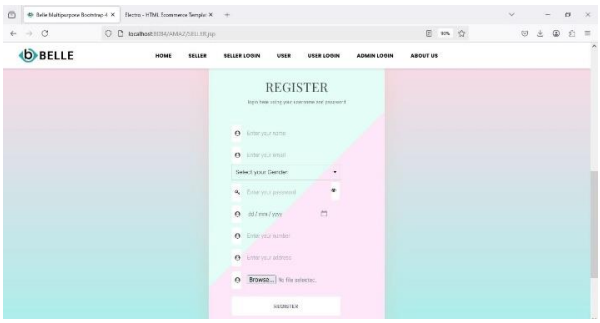

Fig 6.4 Seller Registration Page

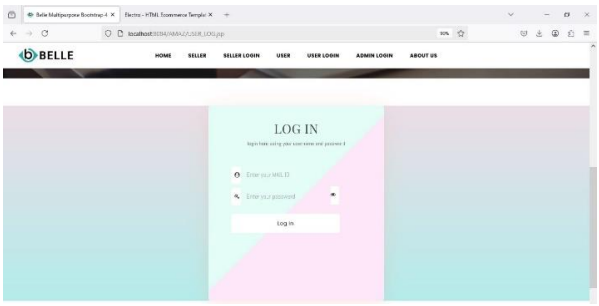

Fig 6.5 Seller Login Page

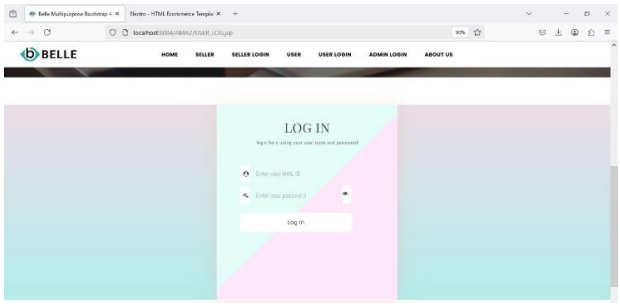

Fig 6.6 User Registration Page

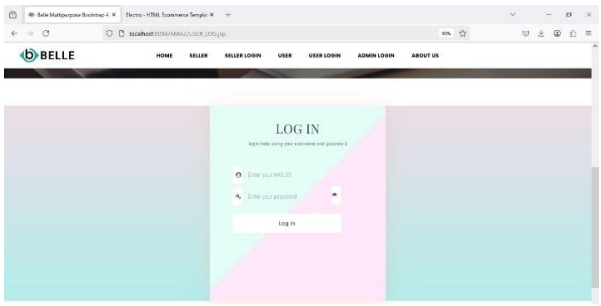

Fig 6.7 User Login Page

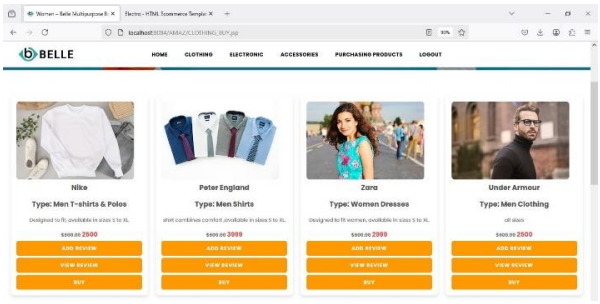

Fig:6.8 View Product page

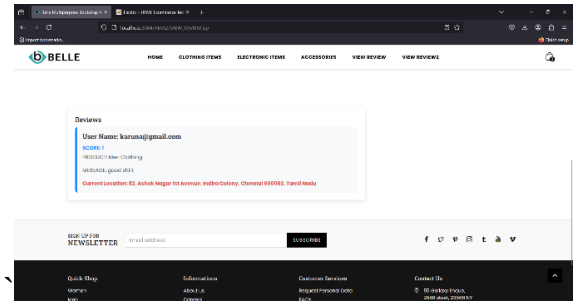

Fig 6.9 Review Analysis

7. CONCLUSION & FUTURE WORK

The Development of two e-commerce platforms allows customers to explore, purchase, and review products.
Product owners can view and compare feedback from both platforms in a centralized dashboard. Integrated sentiment analysis helps evaluate overall product sentiment from customer reviews. The system is secure, scalable, and provides valuable insights for better decision-making.

Future Enhancement: AI-based recommendations and smart contracts for secure, automated shopping and payments.
Voice and image search will allow customers to find products using voice commands or by uploading images for a more convenient shopping experience.

REFERENCE

[1] Zhong Sheng Tan, Chun Hui Chen, Xue Bin Chen, And Xin Yang A Study on Privacy Protection of Cross-Chain Transactions Based on Improved Notary Mechanisms

[2] Syed Afeef Ahmed Shah, Muhammadali Masood, and Amanullah Yasin. Dark Web: E-Commerce Information Extraction Based on name entity recognition using bidirectional-lstm. volume-10, 14 September 2022.

[3] Ant Huaqian He, Guijun Zhou, And Shuang Zhao, exploring e-commerce product experience based on fusion sentiment analysis method. volume-10, 22, October 2022.

[4] Biresh Kumar, Sharmistha Roy, Kamred Udham Singh, Saroj Kumar Pandey, Ankit Kumar, Anurag Sinha, Shubham Shukla, Mohd Asif Shah and Adil Rasool. a static machine learning based evaluation method for usability and security analysis in e-commerce website. volume 11, pp. 40488 – 40510, 22 February 2023.

[5] Xin Xu And Shaojie Zhou. cross-border e-commerce supply chain decision-making considering out-of-stock aversion risk and waste aversion risk. volume 11, pp. 45632 - 45644, 09 may 2023.

[6] Wang Qing, Mohammad Bin Amin, Md. Abu Issa Gazi, Wahiduzzaman Khan, Abdullah Al Masud and Mohammad Nurul Alam. mediation effect of technology adaptation capabilities between the relationship of service quality attributes and customer satisfaction: an investigation on young customers perceptions toward e-commerce in china. volume 11, pp. 123904 - 123923, 30 October 2023.

[7] X. Chen, P. Cong, And S. Lv, ‘‘a long-text classification method of chinese news based on bert and cnn,’’ ieee access, vol. 10, pp. 34046–34057, 2022.

[8] X. She, J. Chen, And G. Chen, ‘‘joint learning with bert-gcn and multi attention for event text classification and event assignment,’’ ieee access, vol. 10, pp. 27031–27040, 2022.

[9] S. K. Hashemi, S. L. Mirtaheri, And S. Greco, fraud detection in banking data by machine learning techniques, ieee access, vol. 11, pp. 3034–3043, 2023.

[10] T. H. Pranto, K. T. A. M. Hasib, T. Rahman, A. B. Haque, A. K. M. N. Islam, And R. M. Rahman, blockchain and machine learning for fraud detection: a privacy-preserving and adaptive incentive-based approach, ieee access, vol. 10, pp. 87115–87134, 2022.