

Predictive Analytics for Customer Churn in E-Commerce with Chatbot conversation using Full stack web development

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ABSTRACT

This project focuses on predicting customer churn in e-commerce platforms using machine learning and full stack web development. It collects customer behaviour data such as purchase history, browsing patterns, and time spent on the website. Python-based machine learning algorithms analyze this data to identify customers who are likely to stop using the platform. The system does not stop at prediction but takes proactive action to retain customers. When a potential churn user is detected, an intelligent chatbot is activated. The chatbot interacts with customers in a friendly manner and provides assistance. It answers user queries and improves engagement. The chatbot may also offer personalized recommendations, discounts, or special deals. The entire system is developed using Python full stack technologies. By combining predictive analytics with chatbot interaction, the project helps e-commerce businesses reduce customer churn and improve customer satisfaction.

KEYWORDS- *shopping cart, product catalog, payment gateway, online payment, digital wallet, management, logistics, delivery, customer reviews, SEO, digital marketing, CRM, security, cloud computing, AI, chatbots.*

INTRODUCTION

E-commerce platforms face intense competition due to the rapid growth of online shopping. Customers have many choices and can easily switch platforms if they are dissatisfied. Many businesses notice that users stop visiting or purchasing after some time, leading to revenue loss. This behaviour is known as customer churn. Understanding customer behaviour and predicting churn is crucial for business growth. Traditional methods of customer analysis are often manual and time-consuming. Data science and machine learning enable automatic analysis of customer data. These techniques help identify customers who are likely to leave the platform. This project focuses on predicting customer churn using machine

learning models. It also improves customer engagement through chatbot interactions integrated into a Python full stack web application.

LITERATURE SURVEY

The literature survey reviews existing research on customer churn prediction in e-commerce systems. Many studies use machine learning algorithms such as Logistic Regression, Decision Trees, and Random Forest for churn analysis. Researchers have identified customer behaviour, purchase history, and engagement levels as key factors influencing churn. Data preprocessing and feature selection are highlighted as critical steps for improving model performance. Some studies explore the use of deep learning for handling large and complex datasets. Several researchers focus on predictive analytics to help businesses take preventive actions. Chatbots are also studied for enhancing customer interaction and support services. Literature shows that chatbots improve user satisfaction and retention. However, most existing systems focus only on churn prediction. This project extends previous work by integrating churn prediction with chatbot interaction in a full stack web application.

EXISTING METHODS

In the existing system, customer churn management in e-commerce platforms is

mostly handled manually and using traditional methods. Businesses rely on historical sales data, customer complaints, and basic statistical analysis to understand customer behaviour. Some systems use simple rule-based techniques, such as identifying customers who have not logged in or made purchases for a long time. In a few cases, traditional machine learning models are applied, but they function separately from customer interaction systems. Customer support is largely manual and depends on human representatives. Customers are usually contacted only after problems occur. There is no real-time engagement with users. Personalized communication and offers are rarely provided. These systems struggle to process large volumes of customer data efficiently. As a result, customer churn is often identified too late, leading to revenue loss.

PROPOSED SYSTEM

The proposed system uses predictive analytics and machine learning to identify potential customer churn in advance. Customer data such as purchase history, browsing behaviour, and interaction patterns is collected and analyzed automatically. Python-based machine learning models predict customers who are likely to leave the platform. Instead of reacting after churn occurs, the system

takes early preventive action. An intelligent chatbot is activated when a potential churn customer is detected. The chatbot communicates with customers in real time. It provides support, answers queries, and offers personalized recommendations or discounts. The entire system is developed using Python full stack web technologies.

SYSTEM ARCHITECTURE

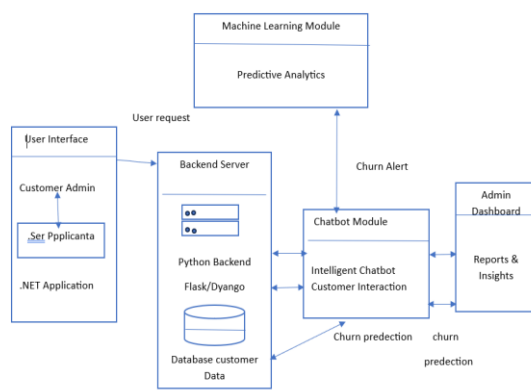


Fig 1: Architecture

METHODOLOGY DESCRIPTION

By using the block diagram, we can describe how customer data is collected from the e-commerce platform and processed to predict customer churn. After data collection, the customer information is analyzed using machine learning techniques. If the system correctly identifies a potential churn customer, appropriate actions are triggered; otherwise, no action is taken. The final step focuses on retaining the customer through chatbot interaction and personalized engagement.

Customer Data Input: Customer data such as purchase history, browsing behaviour, login frequency, and time spent on the website is collected.

Data Preprocessing: The collected data is cleaned by removing missing values, duplicates, and irrelevant information.

Data Transformation: The cleaned data is converted into a suitable format for machine learning analysis.

Feature Selection: Important customer behaviour features influencing churn are identified.

Model Training: Machine learning algorithms are trained using historical customer data.

Churn Prediction: The trained model predicts whether a customer is likely to churn.

Chatbot Activation: If churn is detected, an intelligent chatbot interacts with the customer in real time.

Output Display: Prediction results and chatbot interactions are displayed to administrators and recorded for monitoring.

RESULTS AND DISCUSSION



Fig 2: Home Page

The home page provides an overview of the e-commerce platform and allows users to navigate to different services easily.



Fig 3: Signup Page

The signup page allows new users to create an account by entering basic registration details

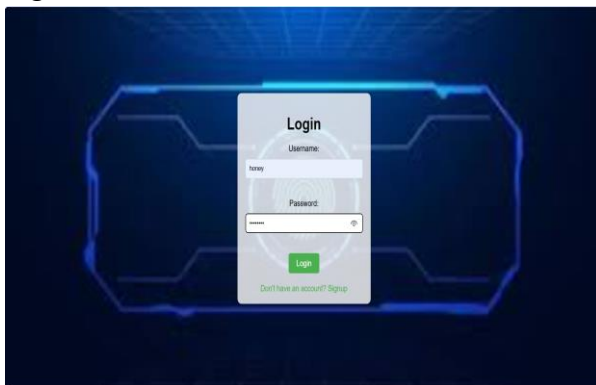


Fig 4: Login Page

The login page enables registered users to securely access their account using valid credentials.

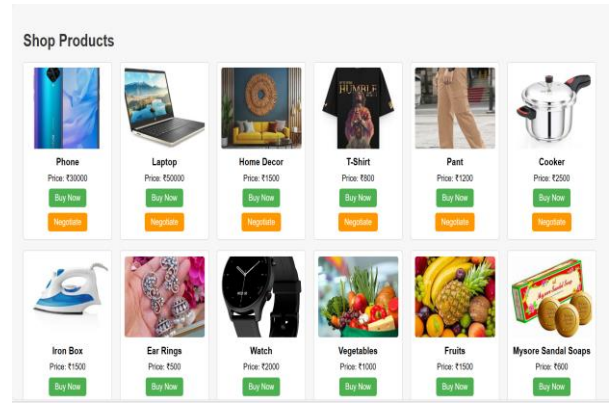


Fig 5: Shop Page

The shop page displays available products and allows users to browse and select items for purchase.



Fig 6: Chabot Page

The chatbot interacts with users in real time, answers queries, and improves customer engagement using NLP.

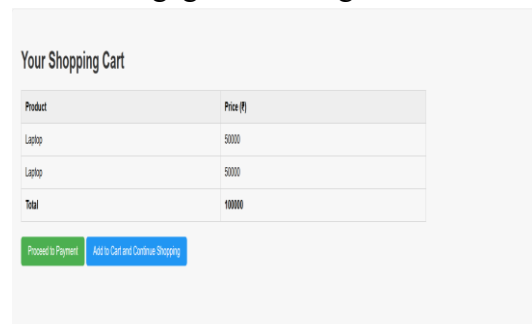


Fig 7: Shopping Cart

The cart page shows selected products and allows users to review items before proceeding to payment.



Fig 8: Payment Page

The payment page allows users to complete their purchase using secure transaction methods.

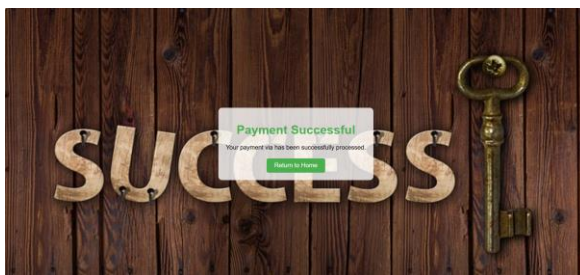


Fig 9: Payment Success Page

This page confirms successful payment and provides transaction completion details to the user.

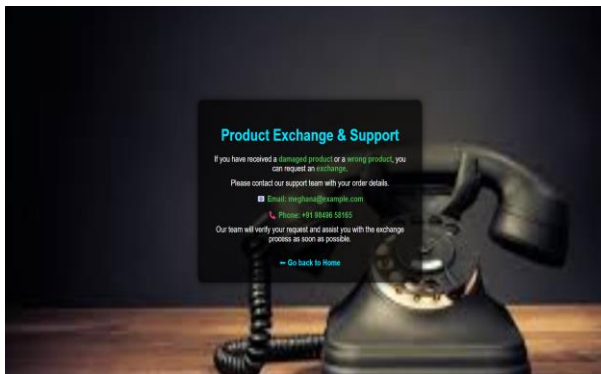


Fig 10: Contact Page

The contact page allows users to communicate with the admin for support, feedback, or queries.

CONCLUSION

The goal of this research is to employ machine learning techniques to anticipate client attrition in e-commerce. To determine which users are most likely to quit the site, customer behaviour data is examined. The

incorporation of a chatbot facilitates timely client engagement.

The chatbot gives discounts, recommendations, and immediate assistance to enhance the user experience. Python full stack web development is used in the system's construction. It increases client retention and minimizes human labour. Churn forecasts are monitored with the aid of the admin dashboard. All things considered, the system is effective and easy to use. It facilitates making decisions based on facts. The significance of predictive analytics in e-commerce is demonstrated by this initiative.

FUTURE ENHANCEMENT

More sophisticated deep learning models may be employed in the future to increase forecast accuracy. To improve performance, real-time tracking of client behaviour can be included. Multilingual support can be added to the chatbot. It is also possible to use voice-based chatbot interaction. It is feasible to integrate with mobile applications. Scalability can be enhanced by cloud deployment. Customers can have further customization options. It is possible to incorporate customer sentiment analysis. The technology can be expanded to other industries, such as telecom and finance. Continuous learning models can further improve results.

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