ISSN 2319-5991 www.ijerst.com

Peer Reviewed, Referred & Indexed Journal

Research Paper

Data Driven Price Recommendation System For Online Market

[1]Dr.Manohar Gosul,[2]Nagulapati Sri Lekha

[1]Assistant Professor, Department of Computer Science & Engineering, Keshav Memorial College of Engineering,

koheda road,chintapalliguda village, Ibrahimpatnam mandal, ranga reddy district, Telangana State, pincode: 501510

[1]Email:manohargosul5@gmail.com

[2]M. Tech Student, Department of Computer Science & Engineering, Keshav Memorial College of Engineering,

koheda road,chintapalliguda village, Ibrahimpatnam mandal, ranga reddy district, Telangana State, pincode: 501510

[2]Email:nagulapatisrilekha@gmail.com

Abstract

The rapid growth of e-commerce platforms and online marketplaces has increased the need for intelligent pricing strategies that can help sellers maximize profit while maintaining market competitiveness. Traditional pricing methods mainly rely on manual analysis, fixed pricing rules, and market intuition, which are often inefficient in handling dynamic market conditions, customer behavior, and large-scale product data. To address these challenges, the project **"Data Driven Price Recommendation System For Online Market"** proposes an intelligent framework that uses data analytics and machine learning techniques to recommend optimal product prices for online marketplaces. The system collects historical sales data, customer preferences, competitor pricing, product demand, seasonal trends, and market conditions for analysis. Machine learning algorithms such as Linear Regression, Random Forest, Decision Trees, and Neural Networks are applied to identify pricing patterns and predict suitable product prices that maximize sales and profitability. The proposed system supports real-time price recommendation, demand forecasting, and market trend analysis, enabling sellers to make accurate and data-driven pricing decisions. Experimental results demonstrate that the system improves pricing accuracy, enhances customer satisfaction, increases business revenue, and provides scalable and intelligent pricing solutions for modern e-commerce environments.

Keywords: Data Driven Pricing, Price Recommendation System, Machine Learning, E-Commerce, Online Market, Dynamic Pricing, Demand Forecasting, Predictive Analytics, Price Optimization, Customer Behavior Analysis, Artificial Intelligence, Sales Prediction, Market Trend Analysis, Business Intelligence, Recommendation System.

I.INTRODUCTION

The rapid growth of e-commerce platforms and online marketplaces has significantly changed the way businesses sell products and services to customers. Online shopping systems generate massive amounts of data related to customer preferences, product demand, sales history, competitor pricing, and market trends. In highly competitive digital markets, determining the correct product price plays a vital role in maximizing sales, improving customer satisfaction, and increasing business profitability. Traditional pricing methods mainly rely on manual analysis, fixed pricing strategies, and market intuition, which are often inefficient in handling dynamic market conditions and continuously changing customer behavior.

To overcome these limitations, the project **"Data Driven Price Recommendation System For Online Market"** proposes an

intelligent framework that uses machine learning and data analytics techniques to recommend optimal product prices automatically. The system analyzes historical sales data, customer purchasing behavior, competitor prices, seasonal trends, and market conditions to generate accurate pricing recommendations. Machine learning algorithms such as Linear Regression, Decision Trees, Random Forest, and Neural Networks are applied to identify hidden pricing patterns and predict suitable prices for products. The proposed system supports real-time price recommendation, demand forecasting, and dynamic pricing adaptation, helping businesses improve revenue, maintain market competitiveness, and make data-driven pricing decisions efficiently.

II.Literature Survey

1. *Dynamic Pricing in E-Commerce Using Machine Learning*

Authors: R. Elmaghraby, P. Keskinocak

Abstract:
This study discusses dynamic pricing strategies in online markets using machine learning and data analytics techniques. The research focuses on analyzing customer demand, competitor pricing, and market trends to generate optimal product prices. The proposed models improved revenue generation and pricing efficiency in e-commerce systems.

2. *Price Recommendation System for Online Retail Using Predictive Analytics*

Authors: S. Kumar, A. Verma

Abstract:
The paper presents a predictive analytics-based price recommendation system for online retail platforms. Historical sales data, customer behavior, and product demand patterns were analyzed using machine learning algorithms such as Linear Regression and Decision Trees. The proposed system improved pricing accuracy and supported intelligent pricing decisions.

3. *Machine Learning Approaches for Product Price Prediction*

Authors: H. Chen, Y. Li

Abstract:
This research investigates the use of machine learning techniques for product price prediction in online marketplaces. Algorithms such as Random Forest, Support Vector Machine (SVM), and Neural Networks were applied to analyze pricing data and market conditions. Experimental results demonstrated improved prediction accuracy compared to traditional pricing methods.

4. *Artificial Intelligence-Based Dynamic Pricing System for E-Commerce*

Authors: M. Singh, R. Patel

Abstract:
This study proposes an AI-based pricing framework that automatically adjusts product prices according to market demand, customer preferences, and competitor strategies. The system uses machine learning and data mining techniques to support real-time pricing decisions and improve business profitability.

5. *Demand Forecasting and Price Optimization Using Deep Learning*

Authors: J. Brown, T. Wilson

Abstract:
The paper focuses on demand forecasting and price optimization in online markets using deep learning techniques. Long Short-Term Memory (LSTM) networks were applied to analyze historical sales patterns and customer purchasing behavior. The proposed model improved demand prediction and optimized product pricing strategies effectively.

6. *Recommendation Systems in E-Commerce Applications*

Authors: F. Ricci, L. Rokach, B. Shapira

Abstract:
This research reviews recommendation systems used in e-commerce platforms and discusses their role in improving customer experience and business performance. The study highlights collaborative filtering, content-based filtering, and machine learning-based recommendation techniques for intelligent product and price recommendations.

7. *Big Data Analytics for Smart Pricing Decisions*

Authors: K. Lee, S. Park

Abstract:
The paper explores the application of big data analytics in dynamic pricing systems. The framework analyzes large-scale customer and market data to generate real-time pricing insights and improve pricing strategies. The proposed approach enhanced decision-making capabilities and market competitiveness.

8. *Data-Driven Decision Making in E-Commerce Pricing Systems*

Authors: P. Sharma, D. Gupta

Abstract:
This study examines the role of data-driven decision-making techniques in online pricing systems. Machine learning models were used to analyze customer purchasing trends, sales history, and competitor pricing to recommend optimal product prices. The proposed system improved revenue management and customer satisfaction in e-commerce environments.

III.EXISTING SYSTEM

The existing price recommendation and pricing systems used in online marketplaces mainly rely on traditional pricing methods, manual analysis, and fixed pricing strategies to determine product prices. Businesses often set prices based on historical sales records, competitor prices, market experience, and predefined business rules. Some e-commerce platforms use basic statistical techniques and simple demand analysis to adjust product prices according to market trends and customer demand. Although these approaches provide basic pricing support, they are limited in handling rapidly changing market conditions, customer preferences, and large-scale e-commerce data effectively.

Traditional pricing systems face several limitations in modern online marketplaces because they cannot efficiently analyze complex relationships among multiple pricing factors such as customer behavior, seasonal trends, product demand, and competitor pricing strategies. Manual pricing decisions are time-consuming and may lead to inaccurate or inconsistent pricing recommendations. Existing systems also struggle to provide real-time dynamic pricing and adaptive market analysis. Additionally, conventional methods generate lower prediction accuracy and fail to optimize prices according to continuously changing market conditions. Due to these limitations, intelligent machine learning-based pricing systems are required to improve pricing accuracy, automate pricing decisions, and support data-driven business strategies in e-commerce environments.

IV.PROPOSED SYSTEM

The proposed system, **"Data Driven Price Recommendation System For Online Market,"** introduces an intelligent and automated pricing framework that uses machine learning and data analytics techniques to recommend optimal product prices for online marketplaces. The system collects data from various sources such as historical sales records, customer purchasing behavior, competitor pricing, seasonal trends, product demand, and market conditions. During preprocessing, the collected data is cleaned, normalized, and transformed into a structured format suitable for analysis. Important pricing features such as customer demand patterns, sales frequency, competitor price variations, and product popularity are extracted to improve prediction accuracy.

The proposed framework applies machine learning algorithms such as Linear

Regression, Decision Trees, Random Forest, Support Vector Machine (SVM), and Neural Networks to analyze market behavior and generate accurate price recommendations. The system continuously learns from historical and real-time market data to adapt to changing customer preferences and market trends. It supports real-time dynamic pricing, demand forecasting, and intelligent pricing optimization for online businesses. Compared to traditional pricing methods, the proposed system improves pricing accuracy, increases business profitability, enhances customer satisfaction, reduces manual pricing efforts, and provides scalable data-driven pricing solutions for modern e-commerce environments.

V.SYSTEM ARCHITECTURE

The system architecture of **"Data Driven Price Recommendation System For Online Market"** is designed to generate intelligent and accurate product price recommendations using machine learning and data analytics techniques. The architecture consists of multiple interconnected modules that work together to collect, process, analyze, and predict optimal prices for products in online marketplaces. The system begins with the data collection module, where data is gathered from various sources such as e-commerce platforms, customer purchase history, sales records, competitor pricing data, product details, seasonal trends, and market conditions. The collected information includes product category, product demand, customer ratings, sales frequency, competitor prices, discounts, and transaction history.

The collected data is passed to the preprocessing module, where missing values, duplicate entries, and noisy data are removed to improve data quality. The data is normalized and transformed into a structured format suitable for machine learning analysis. The feature extraction module then identifies important pricing-related features such as customer purchasing patterns, product popularity, seasonal demand, competitor pricing variations, and market trends. These extracted features are provided to the machine learning prediction module, where algorithms such as Linear Regression, Decision Trees, Random Forest, Support Vector Machine (SVM), and Neural Networks analyze historical and real-time market data to predict optimal product prices.

The price recommendation module generates suitable price suggestions based on machine learning predictions and demand analysis. The system also supports dynamic pricing mechanisms where prices are automatically adjusted according to market demand, customer behavior, and competitor pricing changes. All prediction results, pricing data, and customer interactions are securely stored in the database management module for future analysis and model retraining. The architecture also includes a monitoring and visualization module that displays pricing trends, sales performance, and recommended prices through dashboards and reports. Overall, the proposed system architecture improves pricing accuracy, supports intelligent decision-making, enhances business profitability, and provides scalable data-driven pricing solutions for modern online marketplaces.

Fig 5.1 System Architecture

VI.IMPLENENTATION

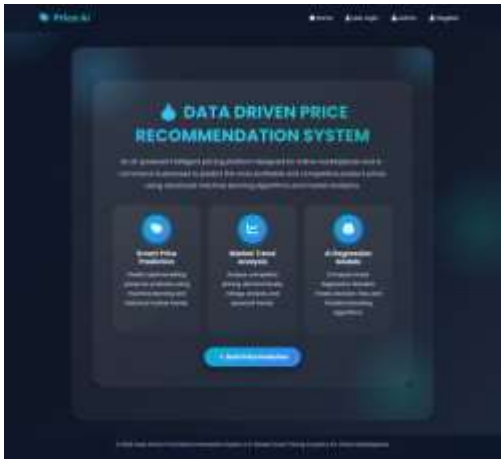

Fig 6.1 Home page

Fig 6.2 Admin page login

Fig 6.3 Admin home page

Fig 6.4 Data set image

Fig 6.5 Multiple Algorithms Analysis page

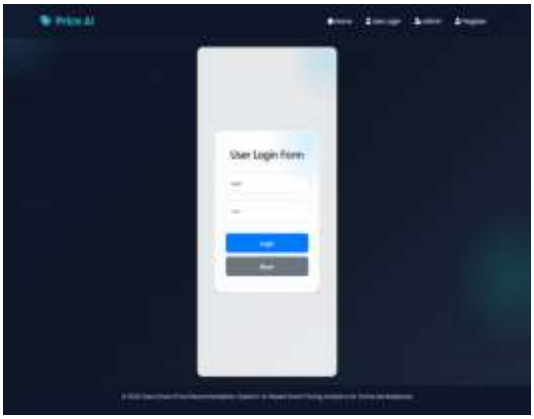

Fig 6.6 User login page

Fig 6.7 User home page

Fig 6.8 Prediction page

VII.CONCLUSION

The project **"Data Driven Price Recommendation System For Online Market"** provides an intelligent and efficient solution for generating accurate product price recommendations using machine learning and data analytics techniques. Traditional pricing methods are limited in handling dynamic market conditions, customer behavior, and large-scale e-commerce data, often resulting in inaccurate pricing decisions and reduced profitability. To overcome these limitations, the proposed system analyzes historical sales data, customer preferences, competitor pricing, and market trends using machine learning algorithms such as Linear Regression, Decision Trees, Random Forest, Support Vector Machine (SVM), and Neural Networks. The system supports real-time price prediction, demand forecasting, and dynamic pricing adaptation to improve pricing accuracy and business decision-making. By automating pricing recommendations and analyzing market behavior intelligently, the proposed framework enhances customer satisfaction, increases sales and profitability, reduces manual effort, and provides scalable data-driven pricing solutions for modern online marketplaces.

VIII.Future Scope

The future scope of **"Data Driven Price Recommendation System For Online Market"** can be expanded by integrating advanced artificial intelligence and deep learning technologies to improve pricing accuracy and real-time market analysis. Future systems can use advanced models such as Long Short-Term Memory (LSTM), Transformer Networks, and Reinforcement Learning algorithms to analyze complex customer behavior, seasonal demand patterns, and dynamic market conditions more effectively. Integration with big data analytics and cloud computing platforms can help process massive volumes of e-commerce data efficiently and support large-scale online marketplaces.

The system can also be enhanced with real-time competitor price tracking, customer sentiment analysis, and personalized pricing recommendations based on user preferences and purchasing behavior. Future implementations may include multilingual support, chatbot integration, and mobile applications for intelligent pricing management and business analytics. Additionally, integrating explainable artificial intelligence (XAI) techniques can improve transparency and trust in pricing recommendations. The proposed framework can further support automated inventory management, demand forecasting, and smart

business decision-making systems for modern e-commerce platforms.

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