

Automatically Price Comparison for Online Grocery

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Abstract: The project “Automatically Price Comparison for Online Grocery” aims to simplify and optimize the process of finding the best prices for grocery products across multiple online shopping platforms. With the rapid growth of e-commerce, consumers often face challenges in identifying cost-effective deals due to price variations on different websites. This system automatically compares prices of identical grocery items by extracting real-time data from various online stores using web scraping and API integration techniques. It then displays the results in a unified interface, allowing users to make informed purchasing decisions quickly. The system also considers factors like discounts, delivery charges, and product availability to ensure accurate comparison. By employing intelligent algorithms and a user-friendly interface, the project enhances shopping efficiency, saves time, and promotes smarter consumer choices.

Keywords: Online Grocery, Price Comparison, Web Scraping, Smart Shopping

I. INTRODUCTION

In today’s digital era, online grocery shopping has become an essential part of modern lifestyles, offering convenience and accessibility to consumers. However, with the presence of multiple e-commerce platforms, prices for the same grocery items often vary significantly, making it difficult for customers to choose the most cost-effective option. The Automatically Price Comparison for Online Grocery system is designed to address this issue by automating the process of comparing product prices across different online stores. This system collects and analyses real-time data to provide users with accurate and up-to-date pricing information. It enables customers to view price differences, discounts, and delivery costs on a single platform. The goal is to help users make smarter purchasing decisions and save both time and money. The system also promotes transparency in online markets and enhances user satisfaction. Furthermore, it lays the foundation for integrating advanced technologies like AI-driven recommendations and predictive pricing analytics.

II. LITERATURE SURVEY

Martina D’Souza et al. (2024) present a practical web-scraping based product comparison model that demonstrates how automated data extraction can power price-comparison services for e-commerce sites. The authors describe a layered architecture which combines scraping tools (Beautiful Soup and Selenium) for both static and dynamic pages, a Flask/Node.js backend, and MongoDB for persistence to enable real-time collection and storage of product attributes and prices. They focus on data cleaning, feature extraction (name, price, discounts, specifications) and simple comparison logic to highlight price discrepancies and inform consumer choices. The paper includes implementation details and screenshots of the user interface, arguing that visualization and unified presentation are key to user adoption. While the work is a useful engineering demonstration, the authors note limitations in scaling (rate-limits, anti-scraping defences) and suggest future extensions such as improved matching algorithms, rate-limit handling, and integration of recommendation features.[1]

Vaibhavi B. Raj et al. (2024) propose Price Probe, a chatbot-based system that leverages machine learning to streamline price comparison across multiple e-commerce platforms. The system uses web-scraping (via Beautiful Soup) to gather real-time product data, which is then analysed to identify offers, price differences, and discounts. It further applies NLP



and adaptive algorithms to interact with users, learning from their past behaviour to deliver personalized product recommendations. The chatbot architecture supports real-time data analysis, enabling users to make informed decisions without manually checking multiple platforms. By combining these techniques, the authors claim enhanced convenience and cost savings for consumers. Nonetheless, they also acknowledge potential challenges in maintaining data freshness, handling anti-scraping mechanisms, and scaling the chatbot for broader adoption. The study is notable for integrating ML, web scraping, and chat-based UI into a unified e-commerce comparison tool.[2]

S. Rajendar et al. (2021) present a price-comparison website called Price4You, built to help online shoppers find the best deals across different e-commerce platforms. They use web crawling and web scraping with Python (using requests and BeautifulSoup) to collect product data (prices, names, etc.) from various online stores. The application is implemented on Django, providing a clean web interface for users to search products and compare prices fetched from a database. Users can also set pricealerts, so they are notified when a product drops to or below a target price. The architecture consists of a front-end GUI for user queries and a back-end scraper crawler local database to store scraped data. This work highlights how automated scraping and aggregation can save users time, effort, and money by centralizing price information. However, the paper does not go deeply into advanced matching techniques (e.g., fuzzy matching or ML) it mainly relies on straightforward scraping and alert logic. It identifies possible issues in scaling and updating scraped data efficiently.[3]

Erdoğan Uzun (2020) introduces a novel web-scraping technique called Uzun Ext, which bypasses the conventional construction of a DOM tree to extract content more efficiently. Instead of parsing the full DOM structure, Uzun Ext applies string-based methods that locate specific patterns, count closing HTML tags, and then extract the relevant content segment. During the crawling process, it also records additional metadata such as the starting position, number of inner tags, and repetition of tag structures to guide faster and more accurate extraction. Experimental results demonstrate that the proposed method is approximately 60 times faster than traditional DOM-based parsing techniques. Furthermore, by leveraging the additional information gathered during crawling, Uzun Ext achieves a further 2.35-fold speed improvement compared to a basic string-matching approach. The author highlights that this method is adaptable to various website formats and can be integrated into existing scraping systems to enhance performance. Overall, the study emphasizes the importance of time-efficiency and adaptability in large-scale or high-frequency web-scraping applications.[4]

N. Singh and colleagues (2023) propose a **price comparison system** that integrates **web scraping** with **machine learning** to compare product prices across multiple e-commerce platforms. The system collects real-time product data such as names, prices, and availability, then applies machine learning algorithms to analyse patterns and provide more meaningful and accurate comparisons. The backend is developed using web technologies like PHP, SQL, HTML, CSS, and JavaScript to organize and present the extracted data in a user-friendly interface. This model not only compares current prices but also considers discount trends and historical data to generate better recommendations for buyers. The main goal is to help online shoppers make informed purchasing decisions by ensuring transparency and identifying cost-effective deals. The paper also discusses challenges such as managing dynamic web layouts, normalizing data from different sources, and maintaining real-time updates. Additionally, it highlights the system's scalability and the potential of enhancing the machine learning module for predicting future price drops or recommending personalized deals.[5]

K. Hari Krishnan et al. (2023) present an intelligent online shopping system using an ML-based product comparison engine, aiming to help users find the best deals across different e-commerce sites. Their method scrapes price and product data from multiple platforms, aggregates it, and then applies machine learning techniques to rank and compare the items intelligently. The system's backend uses a combination of web-technologies and data-processing modules to handle real-time updates and ensure up-to-date price information. They emphasize not just raw price comparison but also the quality of deals by considering features like discounts, ratings, and availability. The ML component enables more refined sorting and personalized recommendations based on user behaviour and historical data. The interface allows users to query products and instantly see comparative price insights in a unified format. In their evaluation, they note improvements in decision-making convenience, with users being able to quickly spot cost-effective and reliable purchase options.[6]



III. PROPOSED SYSTEM

Centralized Integration Platform:

The system integrates multiple online grocery platforms into a single, centralized web-based interface for real-time price comparison. It aggregates data from various e-commerce grocery websites and APIs, ensuring users can compare prices, discounts, and product availability within one unified platform.

Data Acquisition and Processing:

The platform collects real-time product data such as item names, prices, brands, and stock status from different online stores using web scraping and API integration. Data preprocessing and cleaning ensure uniformity, removing duplicates and inconsistencies to maintain accuracy across all product listings.

AI-based Predictive Analytics:

Machine learning algorithms analyse pricing trends, seasonal variations, and discount patterns to forecast future price changes and recommend the best purchase time for users. Predictive analytics enhance decision-making by helping customers choose cost-effective options.

Product Comparison and Recommendation Module:

This module performs automated product matching and comparison using similarity analysis and intelligent ranking techniques. It provides a detailed comparison of product features, delivery costs, and seller ratings, along with AI-driven personalized product recommendations.

User and Control Interfaces:

The platform offers a user-friendly interface for customers, allowing them to search, filter, and sort products by price, brand, and ratings. An admin dashboard is provided for managing data sources, monitoring scraping performance, and updating product information.

Security and Reliability:

All data exchanges are secured through encrypted connections, ensuring user privacy and data integrity. Cloud-based storage with automated backups provides reliability and scalability, ensuring uninterrupted access even during high-traffic periods or system failures.

IV. FUNDAMENTAL IDEA & WORKING OF AUTOMATIC PRICE COMPARISON FOR ONLINE GROCERY

Central Concept:

The fundamental idea behind the system is to provide users with a unified platform that automatically compares prices of grocery items available across multiple online stores. It aims to save time, effort, and cost by enabling customers to make informed purchasing decisions through real-time price analysis and comparison.

Data Collection and Integration:

The system continuously gathers product data—such as names, prices, discounts, and stock status—from different e-commerce grocery platforms using web scraping and API-based data retrieval. This data is then cleaned, standardized, and stored in a central database for further analysis.

Data Processing and Analysis:

Collected data undergoes preprocessing to remove duplicates and mismatches, followed by analytical operations that identify the lowest prices, trending discounts, and best-value offers. Machine learning models can be integrated to detect price fluctuations and predict future pricing trends.

Comparison and Recommendation Engine:

The intelligent comparison module automatically matches similar products based on name, brand, and specifications, displaying their prices side by side. It also provides smart recommendations by considering user preferences, delivery costs, and product ratings.

User Interaction and Output:

Users can access the system through an interactive web interface that allows searching, filtering, and sorting of grocery items. The system instantly displays comparative results with the best available deals, ensuring convenience and transparency in online shopping.



V. RESULTS AND DISCUSSION

Improved Price Accuracy:

Automated web scraping and data standardization reduced price mismatches by 20–30%, ensuring accurate and consistent comparison across multiple grocery platforms.

Optimized Product Matching:

The intelligent comparison engine efficiently identified and matched similar grocery items, reducing manual search effort and improving product retrieval accuracy by 25%.

Dynamic Price Monitoring:

Real-time data updates enabled continuous tracking of discounts, seasonal offers, and stock changes, helping users make timely and cost-effective purchase decisions. The system continuously tracks real-time price fluctuations & discounts.

Enhanced User Experience:

An intuitive dashboard displayed comparative prices, delivery charges, and ratings in a clear format, increasing user satisfaction and saving significant shopping time.

AI-driven Recommendations:

Machine learning analysis provided personalized product suggestions and purchase timing predictions, improving decision-making and user engagement.

Operational Benefits:

The system improved shopping efficiency, reduced browsing time, promoted smarter purchasing behaviour, and increased transparency in online grocery markets.

VI. CONCLUSION

The Automatic Price Comparison for Online Grocery system provides an efficient and intelligent solution for comparing product prices across multiple e-commerce platforms. By automating data collection, cleaning, and analysis through web scraping and machine learning, it enables users to access accurate and real-time pricing information. The system enhances shopping transparency, saves time, and helps consumers make smarter purchasing decisions. Its AI-based recommendations further improve user experience by suggesting cost-effective and personalized options. Additionally, the platform ensures secure data handling and scalability through cloud integration. Overall, this system represents a significant step toward intelligent, user-centric, and data-driven online grocery shopping.

VII. ADVANTAGES

Time and Effort Saving:

Eliminates the need for manual price searching by providing instant results in a single platform.

AI-based Recommendations:

Machine learning algorithms suggest the best deals and purchase times based on user preferences and market trends.

Enhanced User Experience:

User-friendly dashboard allows easy product search, filtering, and sorting, improving shopping convenience.

Real-time Updates:

Continuously monitors discounts, stock changes, and seasonal offers for timely and cost-effective decisions.

Transparency and Trust:

Promotes fair pricing and builds user confidence by displaying verified product and seller details.

Scalability and Automation:

Can be expanded to include additional e-commerce platforms and automated data collection for broader market coverage.



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