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Price Match: Price Comparison and Review Analysis of Products

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ABSTRACT:

The evolving e-commerce environment requires consumers to overcome product deal identification difficulties because prices consistently change among various platforms. Through web-based price comparison tool PriceMatch users can access real-time pricing data because of its use of advanced web scraping techniques data analytics alongside automation which extracts data from major online retailers Amazon, Flipkart and Croma. Users access knowledgeable purchasing decisions because the system tracks prices in real-time while providing historical data analysis and automatic price alert notifications. The application constructs its infrastructure from Flask and Selenium combined with BeautifulSoup thus delivering fast data retrieval and user-friendly operation. The system provides future-enhancing capabilities through its modular design structure while giving users options for making their selection between AI-assisted price predictions and mobile-based platform upgrades and broader marketplace reach expansion. The price comparison automation feature in PriceMatch provides shoppers with affordable shopping recommendations that eliminate repetitive work while improving their entire online shopping experience.

KEYWORDS:

E-Commerce Environment, PriceMatch, Amazon, Flipkart, Croma, Beautiful soup, Future, Enhancing, Shopping Historical Data Analysis.

1. INTRODUCTION

Due to the increasing trends of electronic commerce, consumers are sometimes put in a situation where they have to look for the cheapest prices for products with competing websites. What concerns

prices, it is to be understood that the same product may have very different prices depending on the current strategies of an individual retailer, possible discounts, or seasonal sales. Conventional comparative analysis of prices requires one to physically search the internet selling sites, which is both tiresome and inconsequential. This inefficiency calls for an automatic system that will be able to quickly pull and then compare prices on different online stores. PriceMatch will specifically solve this problem by bringing a real-time price comparison solution to the aid of the users for effortless purchasing.

Real-Time Price Tracking and Automation

Most e-commerce platforms tend to fluctuate their prices so as to correspond with factors such as demand, supply, and special offers. It is almost impossible to individually monitor these volatile prices. PriceMatch incorporates this feature through the use of web scraping techniques that help it to retrieve, analyze and present the current prices of the products in real time. This is because the system incorporates error-checking mechanisms and various data-checking tools so that even if the structure of a particular website changes or the website is temporarily unavailable, it does not cause contradictions. Unlike most of the third-party tracking service, which may use dated or partial information, PriceMatch sources its data from official retail sites which allows users to have the most accurate price information.

Technological Stack and System Architecture

For the same purpose, and to build a reliable and scalable application, PriceMatch uses a set of technologies that mostly include Python, Flask, BeautifulSoup, Selenium, MySQL. The back-end of

Flask implemented enables a smooth flow of communication between the GUI and the parsing mechanisms. BeautifulSoup and Selenium have the massive importance of web scraping in the context as it allows the system to find the necessary data on the structure of the website. The MySQL database effectively stores past price data, and this makes it easier for the users to identify the trending price over time. This enables processing of data, high levels of precision, and a secure system with flexibility and solidity for PriceMatch as a price comparison solution.

Significance and Future Prospects

In this case, it is imperative to create an optimal price comparison system necessary for cutting the costs of shopping online. In integrating a single location to search for the prices, PriceMatch provides the user with ease of use and reduction of effort required to shop online. Such features could be added in the future, including artificial intelligence for predicting the prices, a mobile application as well as integration with other shopping sites; all these would enhance the user experience. This way, with the constant and constant growth of the online retail market the role of such an automated price comparison tool as PriceMatch is crucial for consumers to help them deal with the intricacies of Internet shopping and make wise choices.

2. OBJECTIVES OF STUDY

To accomplish this research study, a main goal is set as the goal is to design and integrate an application namely, PriceMatch – a price comparison tool through which the users would not find it difficult in searching for the best deals online. The dynamic price controls make challenges for the consumers to update the relative dynamic prices and be able to be alert about when relative cheaper prices are in the market. This paper aims at developing a system that uses web scraping technologies and automation to capture, analyze and disseminate real-time price comparison of products such as books, mobiles and tablets from Amazon, Flipkart and Croma. Thus, the use of these technologies such as Python, Flask, BeautifulSoup, Selenium, and MySQL will guarantee the results' accuracy, scalability, and efficiency in terms of data aggregation and analysis. Furthermore, this study seeks to improve the existing functionalities to include analysis of historical prices trends and also provide timed automated alerts so that consumers are able to make informed purchasing decisions. In conclusion, PriceMatch is a beneficial, convenient, and versatile tool, which is aimed to meet a current demand for the centralization of the price monitoring in the sphere of internet shops.

Key Objectives

1. Design an online automated price comparison system that extracts information about prices and their variations from various e-commerce websites in real-time.

2. Apply web scraping techniques by using BeautifulSoup and Selenium for scraping of accurate prices.
3. Synchronize data processing and errors handling in real-time in order to secure data security and credibility.
4. This momentum could be(["= 136"]) integrated with a scalable Flask and MySQL for the large amount of data regarding prices.
5. Offer trend information in order to allow pricing information to be monitored and assessed over time.
6. Integrate auto notifications on the price so that the users are advised of changes in price drop.
7. Improve usability of the product search and being able to easily compare prices in real time with a user friendly interface.
8. Enhance capabilities and AI-based price forecasts as well as expand compatibility with other online retailers in the following versions of the system.
9. Minimizing the use of price comparison by the consumers could be prevented through the automation of the process.
10. It should provide efficiency, expandability and stability to enhance the capabilities to accommodate multiple users as well as massive amounts of data.

3. BACKGROUND WORK

Below is a literature survey table summarizing key research papers related to automated price comparison in e-commerce, focusing on web scraping techniques and their applications.

Author(s) and Year	Paper Title	Findings and Problem Gap
Singh et al., 2023	Triggering an Email Alert Based on Price Comparison by Web Scraping Using Python	Developed a system that scrapes prices from various e-commerce websites and sends email alerts for the lowest prices. Highlights the need for real-time data accuracy and handling anti-scraping measures.
Sakhare et al., 2023	E-commerce Product Price Monitoring and Comparison using Sentiment Analysis	Combined price comparison with sentiment analysis of product reviews to aid consumer decisions. Emphasizes integrating qualitative data for comprehensive insights.
Chen, 2024	Research on Real-time E-commerce Price Comparison System Using Python Web	Analyzed web scraping tools like BeautifulSoup, Scrapy, and Selenium for real-time price

	Scraping Technology	comparison. Discusses challenges with dynamic content and anti-scraping mechanisms.			
Rahman & Tomar, 2021	Threats of Price Scraping on E-commerce Websites: Attack Model and Its Detection Using Neural Network	Explored security threats posed by price scraping and proposed a neural network-based detection mechanism. Highlights the need for balancing data extraction with ethical considerations.		Muneeb & Aamir, 2021	A Comparative Study on Affiliate Marketing Websites Analyzed different affiliate marketing strategies and their effectiveness. Points out the potential of integrating price comparison features to enhance user engagement.
Julian & Friska, 2015	The Use of Web Scraping in Computer Parts and Assembly Price Comparison	Demonstrated web scraping for comparing computer component prices. Points out challenges in maintaining scraper functionality amid website structure changes.			
Ambre et al., 2019	Web and Android Application for Comparison of E-commerce Products	Developed a cross-platform application for product price comparison. Highlights the importance of user-friendly interfaces and real-time data updates.			
Laghmari et al., 2019	Comparison Shopping Engines	Reviewed various comparison shopping engines, their methodologies, and effectiveness. Identifies gaps in data accuracy and user trust.			
Kwarteng et al., 2020	The Influence of Price Comparison Websites on Online Switching Behavior: A Consumer Empowerment Perspective	Investigated how price comparison websites affect consumer behavior. Suggests enhancing transparency and reliability to boost consumer confidence.			
Persson, 2019	Evaluating Tools and Techniques for Web Scraping	Assessed various web scraping tools for efficiency and ease of use. Highlights the need for tools that can adapt to dynamic web environments.			

This compilation provides an overview of existing research in the field of e-commerce price comparison, highlighting methodologies, findings, and identified gaps that can inform future developments in this domain.

4. EXISTING SYSTEM

The current price comparison landscape in e-commerce relies heavily on manual searches or third-party price tracking websites. These platforms often use pre-stored data that may not reflect real-time price changes, leading to inaccuracies. Some e-commerce sites provide in-house price comparison tools, but they tend to favor partnered retailers, limiting users' ability to find the best deals objectively. Additionally, existing systems often lack detailed historical price tracking and trend analysis, making it difficult for users to predict optimal purchasing times. The inefficiency of manually checking prices across multiple platforms highlights the need for an automated, real-time comparison tool.

Drawbacks of the Existing System

1. **Lack of Real-Time Data:** Many platforms rely on cached prices, resulting in outdated comparisons.
2. **Limited Retailer Coverage:** Most services only track prices from a few online retailers, limiting comprehensive deal discovery.
3. **Manual Search Dependency:** Users must verify prices manually, reducing efficiency.
4. **No Historical Price Tracking:** Consumers cannot analyze price trends over time for strategic purchasing.
5. **Bias in Price Listings:** Some platforms prioritize affiliated retailers over objective price comparisons.

5. PROPOSED SYSTEM

To overcome the limitations of existing price comparison systems, PriceMatch is developed as an automated, real-time, and unbiased price tracking tool. It employs web scraping techniques to fetch the latest price data from major e-commerce platforms such as Amazon, Flipkart, and Croma. Through intelligent data processing, the system ensures that users receive accurate and relevant pricing information. Additionally, PriceMatch incorporates historical price tracking, allowing users to analyze past trends and make informed purchasing decisions. By eliminating manual searches and biased price listings, the system provides a transparent and comprehensive price comparison experience.

Advantages of the Proposed System

1. **Real-Time Price Updates:** Ensures users receive the latest pricing information by fetching live data.

2. Automated Price Tracking: Eliminates the need for manual searches across multiple retailers.
3. Comprehensive Retailer Coverage: Offers a broad spectrum of e-commerce platforms for holistic price comparisons.
4. Historical Price Trends: Provides insights into past price fluctuations to aid strategic decision-making.
5. Unbiased Data Representation: Ensures fair and objective price listings, free from affiliate marketing influences.

6. PROPOSED MODEL

Algorithms for Price Comparison System

The PriceMatch system employs various algorithms to efficiently retrieve, process, and present price comparison data. Below are the key algorithms used in the system:

1. Web Scraping Algorithm

Objective: Extract product details and real-time pricing information from e-commerce websites.

Steps:

1. Initialize a Selenium WebDriver to open target e-commerce websites.
2. Search for the desired product using relevant keywords or product URLs.
3. Parse the HTML content using BeautifulSoup to locate product details and price information.
4. Store the extracted data in a structured format for further processing.
5. Handle errors such as CAPTCHA, dynamic content loading, and website structure changes.

2. Price Comparison Algorithm

Objective: Compare prices from different sources and identify the best deal.

Steps:

1. Retrieve the extracted price data for a given product from multiple retailers.
2. Normalize the price format to ensure consistency (e.g., currency conversion, removing extra characters).
3. Sort the prices in ascending order to determine the lowest available price.
4. Display the best deal along with alternative prices from other retailers.
5. Highlight the differences in price, availability, and shipping options.

3. Historical Price Trend Analysis Algorithm

Objective: Analyze historical price data to provide insights into past fluctuations.

Steps:

1. Store fetched price data with timestamps in a database.
2. Retrieve past prices for a selected product over a specified time range.
3. Generate a time-series analysis of price fluctuations.
4. Use statistical models to identify trends, patterns, and potential future price movements.

5. Display a graphical representation of price changes to assist users in decision-making.

4. User Alert Mechanism Algorithm

Objective: Monitor product prices and notify users when a significant price drop occurs.

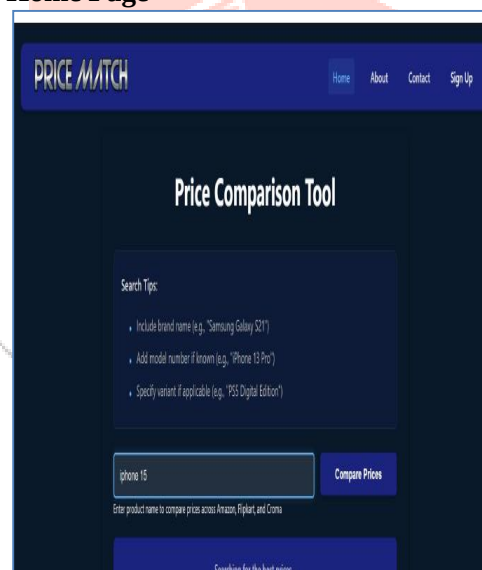
Steps:

1. Allow users to set price thresholds for desired products.
2. Periodically check the latest fetched prices against the user's set threshold.
3. If the current price falls below the threshold, trigger a notification via email or app alerts.
4. Log notifications to ensure users are informed in real time.
5. Provide an option for users to modify or remove alerts based on their preferences.
6. These algorithms collectively enhance the efficiency and accuracy of PriceMatch, ensuring users receive real-time, reliable, and unbiased price comparisons.

7. EXPERIMENTAL RESULTS

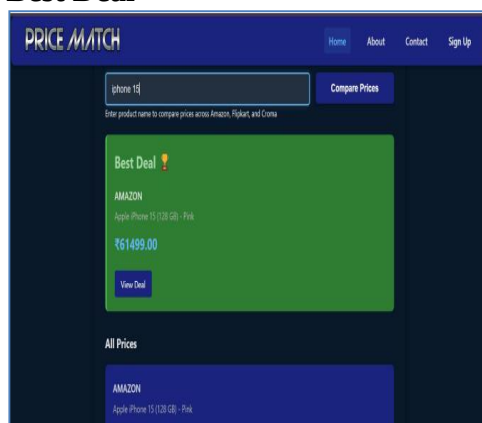
In this project, we utilized Python as the programming language to develop the proposed application, which is executed on Uses Flask to serve dynamic HTML templates for user interaction.

Home Page



Explanation: This screenshot is used to Homepage of price comparison tool.

Best Deal



Explanation: The User can see best deal from this screen.

Prices Based on Several Websites



Explanation: This screenshot is used to Prices from Different Ecommerce sites.

8. CONCLUSION & FUTURE WORK

The PriceMatch system successfully addresses the challenges of manual price comparison by providing a real-time, automated solution for tracking product prices across multiple e-commerce platforms. By integrating web scraping techniques, price comparison algorithms, historical trend analysis, and alert notifications, the system enhances the online shopping experience, enabling users to make informed purchasing decisions. The modular architecture ensures scalability, reliability, and efficient data processing. The platform's unbiased approach to price retrieval further differentiates it from affiliate-driven alternatives. With its user-friendly interface and automation-driven functionality, PriceMatch streamlines the decision-making process, empowering budget-conscious consumers with accurate, up-to-date price information.

FUTURE WORK

While PriceMatch effectively fulfills its core functionality, several future enhancements can further refine its capabilities. The integration of AI-based price prediction models will enable users to anticipate future price fluctuations for better decision-making. Expanding the number of supported e-commerce platforms will enhance coverage and comparison accuracy. Personalized recommendations based on user behavior and preferences will improve engagement. Additionally, developing a mobile application will increase accessibility, while cloud-based deployment will ensure scalability and improved performance. Strengthening security measures against bot detection and refining the user interface for a seamless experience will further elevate the system's usability and efficiency.

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