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Synopsis

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Submitted By:

Faizan Sheikh
Hrishabh Petkar
Malik Sheikh
Harsh Kose
Aditi Chandekar

Seminar In-Charge:

Prof. Vrushali Aware

Department of Computer Science and Engineering



Rajiv Gandhi College of Engineering, Research and Technology, Chandrapur

CERTIFICATE

This is to certify that the Project Synopsis entitled "Price Comparison using Web-scraping and Data Analysis" carried out by Faizan Sheikh(CSEA650), Hrishabh Petkar(CSEA630), Malik Sheikh(CSEA602), Harsh Kose(CSEA629), Aditi Chandekar(CSEA601) of B.Tech. Third Year of Computer Science and Engineering during the academic year 2022-2023, in the partial fulfilment of the requirement for the award of the degree of Bachelor of Engineering (Computer Science and Engineering) offered by the Dr. Babasaheb Ambedkar Technological University, Lonere.

Prof. Nitin Janwe
Head of Department

Prof. Vrushali Aware
Seminar In-Charge

ABSTRACT

Price comparison is a critical activity in the competitive business landscape, as it allows companies to optimize their pricing strategies and gain an edge over their rivals. Web-scraping and data analysis have emerged as powerful tools for businesses and consumers looking to perform price comparison efficiently and effectively. This report presents an in-depth analysis of the process of price comparison using web-scraping and data analysis.

We describe the different methods and techniques used to scrape data from websites, including the use of web crawlers, API's, and browser extensions. We also discuss the various statistical and analytical techniques used to interpret the data obtained, such as data cleaning, data visualization, and regression analysis.

We provide several examples of price comparison using web-scraping and data analysis, including the comparison of prices for consumer products, such as electronics and household goods, and the analysis of pricing trends in specific industries, such as the airline and hotel industries.

We conclude that web-scraping and data analysis provide a powerful combination of tools for businesses and consumers looking to perform price comparison. By using these techniques, companies can gain insights into pricing trends, optimize their pricing strategies, and stay ahead of the competition. Consumers can also use web-scraping and data analysis to find the best deals and make informed decisions about purchasing.

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Introduction

Price comparison is a process that involves comparing the prices of similar products or services across different retailers or vendors to determine the best deal. For businesses, price comparison is an important aspect of their competitive strategy as it allows them to monitor their competitors' prices and adjust their pricing accordingly. Consumers also benefit from price comparison as it allows them to find the best deals and save money.

Web-scraping and data analysis have revolutionized the way businesses and consumers approach price comparison. Web-scraping involves using specialized software to extract data from websites, and data analysis involves using statistical techniques to analyze and interpret the data obtained from web-scraping. This approach provides businesses and consumers with a wealth of information about prices across different retailers and vendors, enabling them to make informed decisions about pricing and purchasing.

Web-scraping and data analysis can also provide insights into trends in pricing, such as seasonal price fluctuations, price trends in specific industries, and trends in response to changes in the market. This information can be used by businesses to plan their marketing and pricing strategies, optimize inventory, and make more informed decisions about product offerings. For consumers, this information can help them identify the best time to make a purchase and find the best deals.

Overall, price comparison using web-scraping and data analysis is a valuable tool for businesses and consumers alike. It provides a comprehensive view of pricing across different retailers and vendors, helps identify trends in pricing, and allows businesses and consumers to make more informed decisions about pricing and purchasing.

Aim and Objective

Aim: The aim of the project "Price Comparison using Web-scraping and Data Analysis" is to explore the process of price comparison using web-scraping and data analysis techniques. The project aims to provide a comprehensive understanding of the methodology involved in web-scraping and data analysis, and how it can be used to perform price comparison across different retailers and vendors.

Objective:

1. To develop a web-scraping process to extract pricing information from various websites using Python's BeautifulSoup library.
2. To clean and organize the extracted data using Pandas library.
3. To analyze the data obtained to identify pricing trends and patterns.
4. To compare prices across different retailers and vendors using statistical techniques such as regression analysis.
5. To provide insights into pricing trends and patterns that can be used by businesses to optimize their pricing strategies and by consumers to make informed purchasing decisions.
6. To demonstrate the usefulness of web-scraping and data analysis for price comparison by providing several real-world examples of its application.

Overall, the aim and objectives of the project are to showcase the benefits of using web-scraping and data analysis for price comparison, and to provide a comprehensive guide for businesses and consumers looking to perform price comparison effectively and efficiently.

Methodology

The methodology for price comparison using web-scraping and data analysis involves several steps:

1. **Website selection:** The first step is to select the websites that will be scraped for price data. Websites are selected based on their popularity, relevance to the products of interest, and accessibility.
2. **Web scraping:** Once the websites are selected, a web scraping tool is used to extract price data. The Python programming language is commonly used for web scraping, with libraries such as BeautifulSoup and Scrapy being popular choices.
3. **Data cleaning:** The extracted data is often raw and requires cleaning before analysis. This involves removing duplicates, correcting errors, and formatting the data to ensure consistency.
4. **Data analysis:** The cleaned data is analyzed using statistical techniques to identify trends and patterns. This may involve calculating measures such as mean, median, mode, standard deviation, and percentiles.
5. **Visualization:** Data visualization techniques can be used to create graphs and charts that help to communicate the results of the analysis to stakeholders.

Software Description: Python is a popular programming language for web-scraping and data analysis. It has a large number of libraries and frameworks that make it easy to scrape data from websites and analyze it.

The following libraries are commonly used for web-scraping in Python:

1. **BeautifulSoup:** This library is used for parsing HTML and XML documents. It provides a simple way to extract data from web pages and supports a wide range of parsing strategies.
2. **Scrapy:** This is a more advanced web scraping framework that allows for more complex web crawling and scraping. It provides features such as distributed crawling, middleware, and pipelines.
3. **Selenium:** This library is used for web automation and allows for the scraping of dynamic websites. It can interact with web pages in a way that mimics human interaction, allowing for more accurate scraping.

For data analysis, the following libraries are commonly used:

1. **Pandas:** This library is used for data manipulation and analysis. It provides data structures for working with labeled data, and supports a wide range of data formats and sources.
2. **NumPy:** This library provides support for numerical computing in Python. It includes functions for mathematical operations, statistical analysis, and linear algebra.

Module Description

The price comparison using web-scraping and data analysis process involves several modules that are used to carry out different tasks. Here is a brief description of each module:

1. **Website selection module:** This module involves selecting the websites that will be scraped for price data. The websites are chosen based on their relevance to the products of interest and accessibility.
2. **Web-scraping module:** This module involves extracting price data from the selected websites using web scraping tools. The extracted data is often in raw format and requires cleaning before analysis.
3. **Data cleaning module:** This module involves cleaning the extracted data to ensure consistency and accuracy. This involves removing duplicates, correcting errors, and formatting the data.
4. **Data analysis module:** This module involves analyzing the cleaned data to identify trends and patterns. This may involve calculating measures such as mean, median, mode, standard deviation, and percentiles.
5. **Visualization module:** This module involves creating graphs and charts to visualize the results of the analysis. This helps to communicate the results to stakeholders.

In addition to the modules described above, there may be additional modules for specific tasks, such as data transformation, data integration, or data validation. The specific modules used will depend on the requirements of the project and the tools and technologies available.

Expected Output

The expected output of a price comparison using web-scraping and data analysis would be a report or dashboard that summarizes the results of the analysis. The report or dashboard should be clear and concise and should communicate the key findings to stakeholders. The following are some examples of the expected output of a price comparison analysis:

1. **Comparison table:** A table that summarizes the prices of the products across different websites. The table should include the name of the product, the website, and the price. This allows stakeholders to compare the prices of different products across different websites.
2. **Price trends chart:** A chart that shows the trends in prices over time. This allows stakeholders to identify patterns and trends in prices and make informed decisions.
3. **Product comparison chart:** A chart that compares the prices of different products across different websites. This allows stakeholders to see which products are the most expensive and which ones are the most affordable.
4. **Recommendations:** Based on the analysis, the report or dashboard should provide recommendations for stakeholders. For example, the report might suggest purchasing a particular product from a specific website because it offers the best value for money.

The specific output of the analysis will depend on the requirements of the project and the needs of the stakeholders. The output should be customized to provide the most relevant and useful information to stakeholders.

Future Scope

The future scope of price comparison using web-scraping and data analysis is significant, and it offers many opportunities for further research and development. Some of the potential future scope areas are:

1. **Machine learning-based approaches:** One of the significant future scope areas for price comparison using web-scraping and data analysis is the use of machine learning algorithms. Machine learning algorithms can be trained on historical data to predict future prices and identify patterns in pricing behavior.
2. **Real-time pricing data:** The use of real-time pricing data could improve the accuracy and relevance of price comparison analysis. Future research could focus on developing techniques to scrape pricing data in real-time, thereby providing up-to-date and accurate information.
3. **Integration with e-commerce platforms:** Integrating price comparison analysis with e-commerce platforms could make it more accessible to consumers and businesses. This would allow consumers to access pricing information directly from the e-commerce platform and make informed purchasing decisions.
4. **Expansion to new products and markets:** Price comparison analysis is not limited to specific products or markets. Future research could focus on expanding the scope of analysis to new products and markets to identify new trends and patterns in pricing behavior.
5. **Collaboration with retailers and manufacturers:** Collaboration with retailers and manufacturers could help to improve the accuracy and relevance of price comparison analysis. This could involve partnering with retailers and manufacturers to access pricing data and improve the quality of analysis.

Overall, the future scope of price comparison using web-scraping and data analysis is vast and offers many opportunities for further research and development. By leveraging new technologies and data sources, it is possible to develop more accurate, relevant, and insightful price comparison analysis.

Conclusion

In conclusion, price comparison using web-scraping and data analysis is a powerful tool that can help consumers and businesses make informed purchasing decisions. By scraping data from multiple sources and analyzing it using data analytic techniques, it is possible to identify patterns in pricing behavior, compare prices across different websites, and find the best deals.

In this report, we have discussed the methodology, software description, and module description for a price comparison analysis. We have also provided examples of expected output, including comparison tables, price trends charts, product comparison charts, and recommendations.

Moreover, we have discussed the future scope of price comparison analysis, which includes the use of machine learning-based approaches, integration with e-commerce platforms, expansion to new products and markets, and collaboration with retailers and manufacturers.

Overall, price comparison using web-scraping and data analysis is an important tool for anyone looking to save money or find the best deals. By leveraging the power of data analytic and scraping techniques, it is possible to make more informed purchasing decisions and save money in the long run.

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