UPES
UNIVERSITY OF TOMORROW

MINOR PROJECT- SYNOPSIS

TITLE: BUDGET BASKET

(E-COMMERCE PLATFORM)

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ABSTRACT

In today's highly dynamic and competitive retail market, grocery prices vary significantly across different stores, making it difficult for consumers to find the best deals. *Budget Basket* is an intelligent, web-based price comparison platform designed to help users track and analyze grocery prices across multiple stores. The system aggregates and updates real-time and historical pricing data, providing users with actionable insights for cost-effective purchasing. Through an intuitive interface, predictive analytics, and interactive visualizations, *Budget Basket* empowers consumers to make informed decisions, optimize their grocery shopping, and maximize savings.

By simply selecting their preferred grocery items, users can instantly compare prices across stores and identify the most budget-friendly options, ensuring a hassle-free and economical shopping experience.

In the evolving landscape of e-commerce, platforms like Trivago and Policy Bazar offer users the convenience of comparing prices for single products across various service providers. However, when it comes to groceries, consumers face a more complex challenge—ordering multiple products from different platforms at the best prices. The Budget Basket platform aims to simplify this by providing a centralized hub for customers to compare grocery prices across various e-commerce players without needing to visit multiple platforms.

The Budget Basket platform operates by listing only branded products from various e-commerce platforms. Once a customer searches for an item, the system automatically displays the cheapest option available, though customers are free to select more expensive alternatives. The platform enables users to choose from which retailer they want to purchase, facilitating convenience and offering flexibility in terms of delivery service preferences. Upon confirming the order, the platform handles the distribution of products to the respective platforms and processes the payments accordingly.

INTRODUCTION

Grocery shopping is an important yet costly job for many families in today's fast-paced society. Grocery prices change between retailers, making it difficult for customers to discover the best offers.

Existing price comparison platforms, such as Google Shopping and PriceRunner, primarily focus on electronics and consumer goods, lacking dedicated grocery price tracking features.

Grocery shopping plays a crucial role in household budgets, and price disparities across retailers often lead to overspending. Consumers frequently lack access to a centralized system that provides a transparent and comparative overview of grocery prices. The *Budget Basket* project addresses this gap by offering a user-friendly web application that aggregates, analyzes, and presents grocery prices across various stores. By integrating modern web technologies, database management, and analytics, this platform ensures a seamless, data-driven approach to smart shopping. Users can monitor price trends, compare prices across stores, and make cost-effective purchasing decisions with ease.

LITERATURE REVIEW

[1]-In 2017, Anusha Sreeram, Aniket Kesharwani, and Sneha Desai published a paper that aimed to conceptualize and examine a combined model of online grocery buying intentions. The model extended the Technology Acceptance Model and incorporated additional factors that influence online grocery shopping behavior. These factors included physical effort, time constraints, entertainment value, product assortment, economic value, and an attractive website design. The degree of user satisfaction with online grocery shopping platforms served as the dependent variable in their study.

[2]-In 2007, Daniel Ch. Buser explored the development of online recommender systems for traditional offline grocery stores. The work particularly focuses on the use of RFID technology and plan recognition to track and predict customer movement and behavior within stores. The goal of the study was to create a commercially viable concept where identified variables help maintain a balance between the benefits of sellers and buyers.

[3] The Role of Price Comparison Websites in Online Shopping their 2022 study, Hemanshu Dharmik, Prof. Priyanka Padmane, and their team emphasized the vital role of price comparison websites in the fast-paced world of online shopping. These platforms make it easier for consumers to find high-quality products at reasonable prices by gathering information from various sources. In a time when quick decisions are essential, price comparison websites offer a simple way for consumers to make informed choices without visiting physical stores. This convenience is especially appealing to busy urban consumers, who value the ability to shop online. By easily comparing prices, consumers can identify the best deals, which improves market efficiency and transparency. These technologies not only benefit consumers by providing convenience and better deals but also help local retailers by creating a more competitive and fair marketplace.

[4]In 2023, K. Varun, Mr. P. Rajesh, and their team members conducted a study on websites that compare prices to help customers make informed purchasing decisions. These websites allow users to compare the prices of goods and services from various vendors, saving time for customers, especially those with busy lifestyles in cities. Customers are always looking for the best deals, and by using a price comparison website, they can compare costs for the same product across different businesses. This eliminates the need to visit multiple stores, as

customers can easily decide where to make their purchase by checking prices on the comparison website.

[5]In 2022, Sanket Bezalwar and his team researched websites that evaluate prices, which are designed to compare product prices and offers from various suppliers, helping customers choose products that provide the best value for their online purchases. In today's fast-paced world, especially for urban dwellers, many people prefer to save time by shopping online to meet their needs. Budget-conscious customers often look for the best deals. By using price comparison websites, consumers can access all the information they need in one convenient place, eliminating the need to visit multiple stores to compare prices. This ultimately benefits both customers and online retailers by streamlining the shopping process and ensuring informed decision-making

% of Total Population Online and Off-line Shoping in india

Offline
Users
40%

Online
Users
60%

Total Population of India
(Data according to 2020)

As a consumer, you have the right to choose which store offers the best price for specific products that interest you. To the price offered by any business, however, requires a lot of time and due to a limited time, you cannot compare prices and exit the purchase of certain products at a higher price. With a catalog that published online, sellers can save costs . Increase the price awareness among consumers. Most of the running human beings do not have time to purchase products offline because of busy schedule.

PROBLEM STATEMENT

Consumers face challenges in identifying the most affordable grocery stores due to fluctuating prices and inconsistent pricing across different retailers. Existing solutions do not offer real-time tracking of grocery prices, leading to uninformed purchasing decisions and higher household expenses. As a result, consumers struggle to maximize savings and often miss out on the best deals available.

This project aims to address these issues by developing a **smart web-based platform** that consolidates, analyzes, and visualizes grocery price trends from multiple retailers. By providing real-time price comparisons and insights, the platform will empower consumers to make informed purchasing decisions and optimize their grocery spending with minimal effort.

OBJECTIVES

The primary objectives of this project are:

1. To address the growing demand for online price comparison tools in grocery shopping, similar to platforms like Trivago for hotel booking and Policy Bazaar for insurance. Consumers seek an efficient way to compare prices across multiple retailers and choose the best option, ensuring both affordability and quality in their purchases.

2. Research in **data mining, price forecasting, and consumer behavior analysis** suggests that real-time data collection and predictive modeling significantly enhance cost-saving strategies.

3. Additionally, **database optimization techniques** improve the efficiency of price retrieval and comparison in large datasets.

METHODOLOGY

1. **Data Collection:**
   - Initially, a manually curated/dummy dataset will be used for testing and development.
   - The dataset consists of multiple store price records, where each store has a separate dataset with product prices recorded over time.
   - In future phases, data will be collected dynamically through web scraping from e-commerce platforms to ensure real-time updates.

2. **Data Preprocessing:**
   - Cleaning and normalizing price data to handle missing or inconsistent values.
   - Standardizing product categories to ensure uniformity across different stores.
   - Implementing data transformation techniques to optimize storage and retrieval.

3. **Price Comparison Algorithm:**
   - Implementing Dijkstra's Algorithm to determine the best price path in multi-store analysis by treating stores as nodes and prices as edge weights. This helps identify the cheapest possible route for a given product.
   - Using A/B testing and statistical models to validate pricing trends.
   - Providing users with the best price options for their selected grocery items.
   - Ranking stores based on affordability, quality considerations, and user preferences.

4. **Algorithm Optimization**
   - Utilizing Dynamic Programming to speed up price retrieval and comparisons.
   - Implementing Caching Techniques to store frequently queried price data for fast access.
   - Optimizing API calls and database queries to enhance performance.

5. Product Availability Tracking

- Incorporating web scraping techniques using BeautifulSoup and Scrapy for real-time stock updates.
- Creating a database schema to store product availability records efficiently.
- Implementing an alert system for users to get notified when a product becomes available.

6. Price Prediction Using Previous Trends

- Using Time Series Forecasting (ARIMA, LSTM) to predict future price trends.
- Implementing Machine Learning Regression Models (Linear Regression, Random Forest) to estimate upcoming price variations.
- Providing users with insights into optimal purchase periods.

7. Data Visualization for Consumer Insights

- Integrating interactive visual tools such as matplotlib, Plotly, and D3.js for graphing price trends.
- Providing insights on price fluctuations, seasonal trends, and budget optimization strategies.

8. System Architecture

- Backend Technologies: Python (Flask/Django), Spring Boot for API-driven architecture.
- Frontend Technologies: React.js for dynamic UI, WordPress for content management.
- Database: MySQL/PostgreSQL for structured data storage, MongoDB for unstructured data.

9. Testing and Deployment

- Conducting rigorous unit testing for algorithm validation and functionality.
- Deploying the web application on AWS, Vercel, or Netlify for scalability.
- Ensuring high performance and responsiveness across multiple devices.

APPLICATION

The **Budget Basket** application has a wide range of practical applications for both consumers and businesses:

1. **Smart Shopping Decisions** – Consumers can compare prices of grocery items across multiple e-commerce platforms, ensuring they get the best deal without manually checking different websites.

2. **Cost Optimization for Households** – By analyzing historical price trends and predicting future fluctuations, users can plan their grocery shopping efficiently, making bulk purchases when prices are low.

3. **Retail Market Insights** – The platform provides valuable data visualization tools for businesses and retailers, helping them analyze pricing trends, demand patterns, and competitive pricing strategies.

4. **E-commerce Integration** – Online grocery stores can integrate with the platform to provide real-time price updates and stock availability, attracting more customers through competitive pricing.

5. **Personalized Shopping Experience** – Users can set alerts for pr
ice drops, receive recommendations based on their shopping history, and track spending patterns over time.

6. **Scalability for Future Growth** – With planned integration of web scraping, machine learning, and predictive analytics, the platform can evolve into a comprehensive price intelligence system applicable to various retail segments beyond groceries, such as electronics, apparel, and pharmaceuticals.

7. **Multiple Retailer Integration**: Users can browse products from different e-commerce platforms such as Amazon, Jio Mart, and Grofers all in one place.

8. **Order Consolidation**: Customers can place an order for multiple products from different e-commerce platforms without leaving the Budget Basket platform, and the platform handles order distribution and payment processing across the selected retailers.

SWOT ANALYSIS

STRENGTHS
S
- Real -Time Price Comparison
- User-Friendly Interface
- Data Driven Insights
- Automated Price Tracking
- Multi-Store Integration

WEAKNESSES
W
- Data Dependency
- Limited Initial Dataset
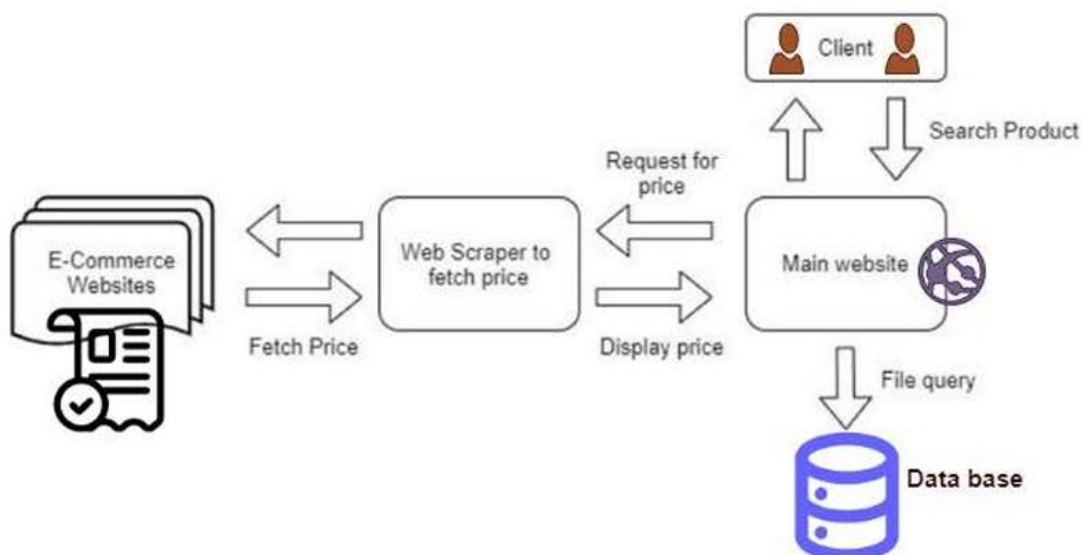- Complex Implementation
- Retailer Cooperation Issues

OPPORTUNITIES
O
- Growing E-commerce Market
- Mobile App Development
- AI-Powered Recommendations
- Retailer Partnerships

THREATS
T
- Competition from Established Platforms
- Data Privacy Concerns
- Regulatory & Compliance Challenges
- Retailer Pricing Strategies

Figure 5: System Architecture

SYSTEM REQUIREMENTS

1. Hardware Requirements:

- **Processor:** Intel Core i5 or equivalent AMD processor with a clock speed of 2.5 GHz or higher.

- **RAM:** Minimum of 8 GB of RAM to ensure smooth execution of Java applications and handling large datasets.

- **Storage:** At least 500 GB of HDD or 256 GB SSD for storing datasets, application files, and logs.

- **Graphics:** Integrated graphics are sufficient as the project does not require GPU-intensive tasks.

- **Network:** Stable internet connection for downloading dependencies and accessing online repositories.

2. Software Requirements:

- **Operating System**: Windows 10 or later, macOS 10.15 or later, or a Linux distribution (e.g., Ubuntu 20.04 or later).

- **Programming Language**: Python or JavaScript (for backend development).

- **Web Framework**: Django (for Python) or Node.js (for JavaScript) for building the web-based platform.

- **Frontend Framework**: React.js or Angular for developing an interactive and responsive user interface.

- **Database**: MySQL or PostgreSQL for storing product and user data, with appropriate connectors for seamless integration.

- **Version Control**: Git for version control, hosted on platforms like GitHub or GitLab.

- **Testing Framework**: Jest or Mocha for frontend testing and PyTest for backend testing to ensure system reliability.

3. Additional Tools:

- **Documentation Tools**: Swagger or Postman for API documentation and testing.

- **Collaboration Tools**: Slack or Microsoft Teams for team communication, and Trello or Jira for project and task management.

- **Build Automation**: Jenkins or GitHub Actions for continuous integration and deployment (CI/CD).

- **Deployment Tools**: Docker for containerizing the application, and Kubernetes for orchestration if scaling is required.

4. Functional Requirements

- **Real-Time Price Comparison**: The system should efficiently aggregate and display real-time grocery prices from multiple e-commerce retailers.

- **Price Tracking**: The platform must track historical price trends and provide insights into price fluctuations for selected products.

- **Product Selection and Ordering**: Users should be able to select products from different retailers, view the cheapest option, and complete the purchase through a centralized payment gateway.

- **Order Distribution**: Once a purchase is made, the system should distribute the order across the selected platforms and process payments accordingly.

5. Non-Functional Requirements

- **Performance**: The platform should be able to handle high traffic volumes and process multiple product searches simultaneously with minimal latency.
- **Scalability:** The system should scale efficiently to accommodate increasing product catalogs, growing user base, and more e-commerce platforms.
- **Security:** Ensure user data privacy and secure transactions by implementing encryption for payments and secure login mechanisms.

6. Deployment Requirements

- The application should be deployable on cross-platform environments (Windows, macOS, and Linux) and accessible via web browsers.

- It should support cloud deployment (e.g., AWS, Google Cloud) for scalability, allowing for high availability and performance optimization during peak shopping seasons.

RESULT

The **Budget Basket** platform is envisioned to simplify the grocery shopping process by aggregating multiple e-commerce platforms in one place, allowing users to compare prices and make purchases seamlessly. Although the platform is still in development, its future capabilities hold immense promise in addressing significant challenges in online grocery shopping. Key anticipated features include:

- **Automated Price Comparison**: The platform will automatically compare prices for selected grocery items across various e-commerce platforms, displaying the cheapest option first while also providing users with alternative, higher-priced choices.

- **Centralized Shopping Experience**: Users will be able to order multiple products from different platforms through Budget Basket, eliminating the need to visit separate retailer websites or apps.

- **Order Distribution**: After the user confirms their selection, Budget Basket will distribute the order to the respective platforms, facilitating a smooth transaction process.

- **Centralized Payment System**: Payments will be processed through Budget Basket, which will then distribute the funds to the appropriate e-commerce players.

The platform's design emphasizes **scalability**, particularly for repeat purchases like groceries. As the user base grows and the platform expands to new product categories, such as **clothing**, **apparel**, **entertainment**, and **food**, Budget Basket will be able to handle increased traffic and transaction volumes without sacrificing performance.

In summary, the **Budget Basket** platform is expected to efficiently aggregate and compare grocery prices across multiple e-commerce retailers, providing accurate and real-time price comparisons for users. The system will simplify the decision-making process, enabling consumers to maximize savings and make informed purchasing choices. Additionally, the platform's ability to consolidate orders from various retailers into a single transaction will enhance the overall shopping experience, contributing to greater convenience and cost-effectiveness for users.

<u>CONCLUSION</u>

The **Budget Basket** platform holds significant potential for transforming the way consumers shop for groceries and other products online. Once fully developed, the platform will provide a seamless and efficient experience for users to compare prices, select products, and complete purchases without needing to navigate multiple platforms. Some of the expected long-term benefits include:

- **Streamlined Shopping Experience**: The platform will address the complexity of browsing different e-commerce sites by consolidating product information, price comparisons, and purchasing options in a single interface.

- **Scalability Across Categories**: Beyond groceries, the platform is designed to scale and accommodate a wide range of product categories, including **clothing**, **electronics**, and **entertainment**, making it a versatile solution for various consumer needs.

- **Personalized Discounts**: With the integration of **credit card spending analytics**, the platform will provide personalized offers based on the user's spending patterns, promoting customer loyalty and engagement.

- **Improved User Engagement**: As the platform grows, it will enhance the overall customer experience by offering more tailored recommendations, discounts, and shopping options based on past behavior.

In conclusion, the **Budget Basket** platform, while still in its early stages, has a clear roadmap for future growth. With its scalability, integration potential, and focus on streamlining the shopping process, it is poised to become a comprehensive solution that benefits both consumers and e-commerce platforms alike. The platform's ability to adapt and expand to various product categories and integrate personalized incentives will ensure its long-term success in the competitive e-commerce landscape.

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