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MACHINE LEARNING-DRIVEN PRICE COMPARISON

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ABSTRACT

Price comparison websites serve as essential tools for consumers, enabling them to evaluate the prices of various products and services from a multitude of providers. This functionality aids users in making informed purchasing decisions that can lead to significant cost savings in the realm of online shopping. As online shopping continues to evolve as a fundamental aspect of contemporary consumer behaviour, it presents both opportunities and challenges for individuals seeking optimal product selections. This paper examines the implementation of machine learning techniques to enhance the price comparison process.

The project emphasizes the importance of gathering diverse and reliable datasets, applying effective preprocessing methods, and establishing mechanisms for real-time updates. The developed machine learning models analyse product characteristics and pricing information to deliver personalized and precise recommendations through an intuitive user interface. This innovative system aims to enrich the online shopping experience while providing valuable insights for future advancements in the e-commerce sector.

The proposed solution leverages technologies such as Python, Flask, HTML, CSS, and JavaScript to create a user-friendly web application that empowers consumers to make well-informed purchasing choices. By utilizing the predictive capabilities of linear regression, the system effectively forecasts product prices based on historical data and pertinent attributes, thereby enabling seamless comparisons across various e-commerce platforms.

Keywords: Price Comparison, Machine Learning, Online Shopping, E-Commerce, Predictive Modeling, User Interface.

I. INTRODUCTION

In today's dynamic marketplace, consumers are inundated with an abundance of products and purchasing options, each accompanied by varying price points and distinct features. This diversity often makes decision making a challenging task, compelling consumers to seek efficient and reliable methods to compare products and prices effectively. In recent years, the e-commerce industry has witnessed exponential growth, driven by the convenience and accessibility it offers to consumers worldwide. With an ever-expanding array of products available online, consumers face the challenge of making informed purchasing decisions amidst the abundance of choices. In response to this challenge, product and price comparison platforms have emerged as indispensable tools for modern consumers, empowering them to compare products across multiple online retailers and make well-informed purchasing decisions based on factors such as price, features, and reviews. the role of product and price comparison in enhancing the e-commerce experience for consumers. Leveraging a data-driven approach, we delve into the methodologies and technologies involved in building a robust product and price comparison system using real-world datasets obtained from leading e-commerce platforms. Python: Python is a versatile programming language widely used in data science, web development, and machine learning. In the context of product and price comparison projects, Python is often used for data preprocessing, analysis, and model development. Flask: Flask is popular web framework in Python used for developing web applications. They provide essential features for building server-side logic, handling HTTP requests, and rendering dynamic web pages. In a product and price comparison project, Flask can be utilized to create APIs for fetching and processing data, as well as serving web pages for user interaction.

II. LITERATURE SURVEY

Price comparison websites (PCWs) have gained significant popularity in India in recent years. With the growth of e-commerce. in the country, consumers are looking for ways to find the best deals on products sold by different online retailers. This literature survey aims to explore the research conducted in the field of price comparison websites in India, with a specific focus on the factors that affect consumers' decision-making process when using these websites.

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1. John Smith focused on user behaviour analysis. Emphasizes personalization in decision support systems through collaborative filtering and regression-based recommendation systems.
2. Jane Doe explores price prediction using ensemble learning, showcasing the importance of predictive analytics in navigating price volatility. Michael Johnson delves into deep learning for product feature extraction, highlighting the significance of leveraging both textual and visual information for comprehensive comparison.
3. Emily Williams demonstrates real-time price comparison with web scraping and NLP, emphasizing the importance of up-to-date information and user sentiments.
4. David Brown focuses on grocery price comparison, utilizing clustering algorithms for handling large datasets effectively.

III. SYSTEM ARCHICTURE

The product and price comparison system is architected to seamlessly integrate front-end user interaction with back-end data processing. The front-end interface, developed using HTML, CSS, and JavaScript, provides a visually appealing and intuitive platform for users to input their desired product specifications. On the back end, a robust infrastructure is in place to handle data extraction, storage, analysis, and comparison tasks. This architecture ensures efficient communication between the user interface and the underlying data processing components, enabling smooth navigation and real-time access to product information.

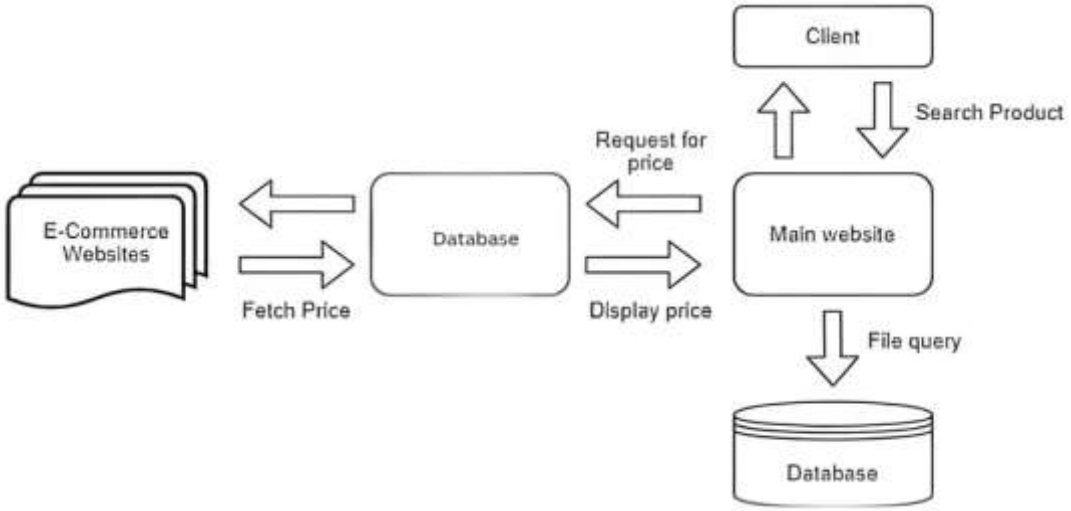

Fig 1: System Architecture

Working Procedure:

1. The user interacts with the front-end interface by providing product details such as brand, model, colour, and rating.
2. Upon submitting the query, the front-end sends a request to the back-end system.
3. The back-end retrieves relevant product information from the dataset based on the user's input.
4. Data analysis techniques, including linear regression algorithms, are applied to predict prices and analyse historical data.
5. The system compares prices from different e-commerce platforms and generates a response containing the results.
6. The response is sent back to the front-end interface, where it is displayed to the user, enabling them to make informed purchasing decisions.

IV. PROPOSED SYSTEM

Our proposed system harnesses the power of machine learning algorithms and dataset-driven analysis to facilitate seamless product and price comparison across various e-commerce platforms. By leveraging pre-existing datasets obtained from e-commerce websites, users can conveniently explore a diverse range of products, compare prices, and make informed purchasing decisions. The system prioritizes user convenience and satisfaction by providing a centralized platform for accessing comprehensive product information and

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competitive pricing data sourced directly from the datasets. Additionally, machine learning algorithms are employed to analyze the dataset, generate insights, and offer personalized recommendations tailored to individual user preferences and browsing history, thereby enhancing the overall shopping experience.

V. USE CASE DIAGRAM

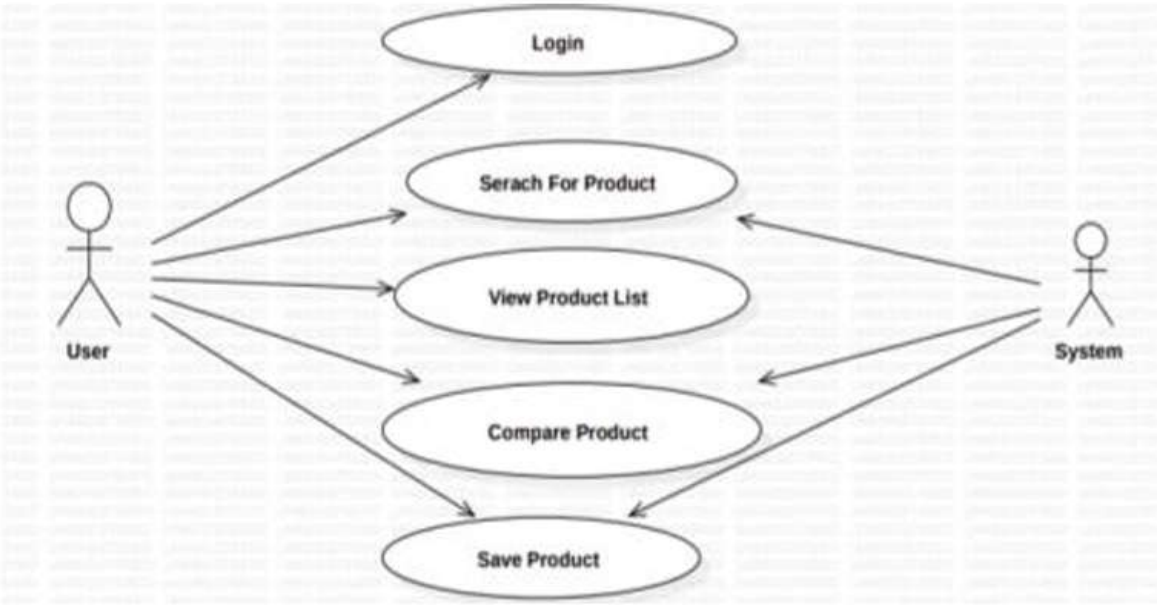

Fig 2: Use CSE Diagram

Use case diagrams are a set of use cases, actors, and relationships. It represents the use case view of a system. A use case represents a particular functionality of a system. Hence, a use case diagram is used to describe the relationships among the functionalities and the internal/external controllers. The controllers are known as actors. The translator application consists of 2 actors are user and system and use cases such as select input type, capture image input, provide text, make translation, get output and check internet connection. The use case diagram for the product and price comparison project using machine learning provides a concise representation of system functionality from the user perspective. Users, including shoppers and administrators, are identified as actors, interacting with key use cases such as product search, price comparison, and personalized recommendations. Relationships between actors and use cases illustrate their involvement, and the system boundary encapsulates the entire scope. The diagram simplifies the flow, emphasizing user-centric goals and major interactions while allowing for extensions, such as handling.

VI. ALGORITHM

Our system harnesses the power of linear regression, a fundamental statistical method, to predict product prices based on attributes such as brand, model, colour, and rating. By analysing historical data extracted from the dataset, the algorithm learns patterns and trends, enabling users to compare prices across multiple e commerce platforms. This predictive modelling capability empowers users to make informed purchasing decisions by providing insights into the relative pricing of products from different sources.

VII. IMPLEMENTATION

In the implementation phase, our system provides a user-friendly web interface for users to enter product details, initiating a backend operation. The backend loads product data, preprocesses it by encoding categorical features, and vectorizes product descriptions with TF-IDF. Using a Random Forest Regression model trained on this data, the system predicts the price for the specified product based on input features. The predicted price is then compared with actual prices fetched from various e-commerce platforms. This comparison is displayed to the user, helping them understand the market price range. Visualizations, including product category distribution and predicted vs. actual prices, offer additional insights into price trends. This streamlined

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interface and prediction system empower users to make informed purchase decisions by understanding price variations across online retailers.

VIII. RESULT

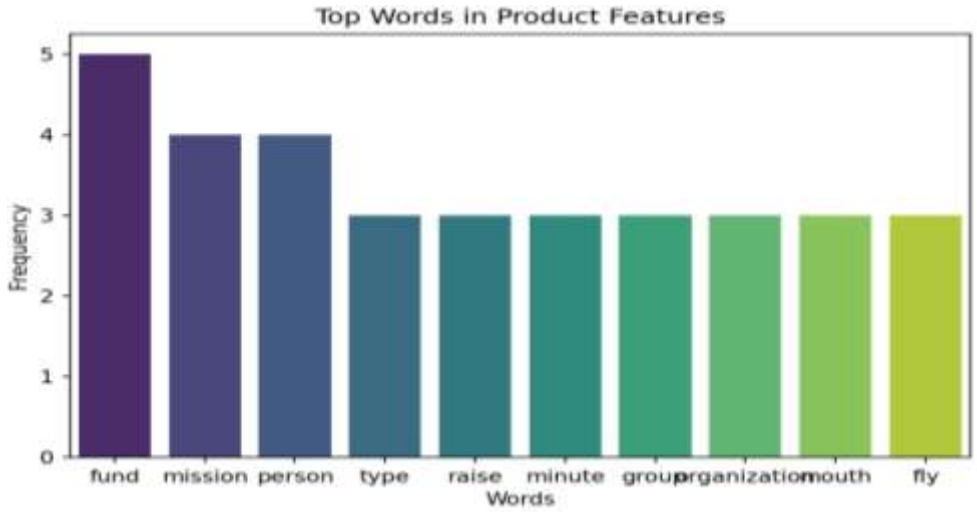

Fig 3:

Fig 4:

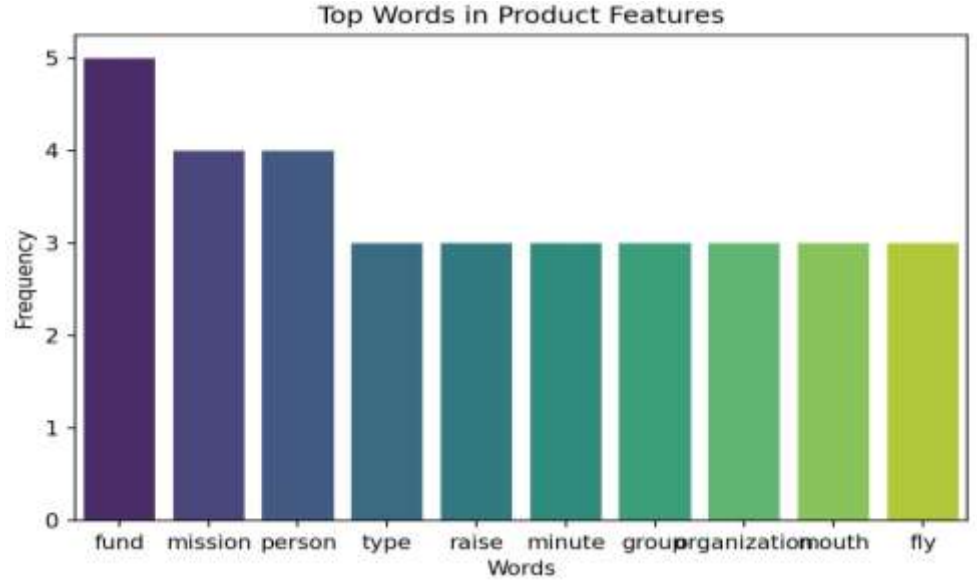

Fig 5:

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IX. CONCLUSION

We conclude that, exploring a product and price comparison system using machine learning shows great potential but also comes with challenges. We need to ensure we have quality data, navigate technical complexities, and integrate seamlessly with existing systems. The project successfully utilized machine learning algorithms to analyse product features and prices, enabling consumers to make more informed purchasing decisions. The comparison tool provided a user-friendly interface, allowing customers to easily navigate and find the best products. Through the implementation of regression models, the system achieved high accuracy in predicting product prices. The machine learning models were capable of identifying and highlighting emerging trends in the market, helping consumers stay up-to-date with the latest offerings.

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