**Group-11**

**Retail Price Recommender for Maximum Profit: Project Report**

**Executive Summary:**

This project aims to develop a Retail Price Recommender system to maximize profits through data-driven insights and analysis. By leveraging historical sales data, the system identifies optimal pricing strategies for various products, considering factors such as date, product attributes, and sales figures. The primary objective is to recommend a price point for each product that maximizes profitability without compromising on sales volume.

**Introduction:**

The Retail Price Recommender system utilizes a dataset comprising sales data, including product identifiers, sale dates, prices, costs, and sales figures. The analysis focuses on understanding the relationship between price and sales volume and how various factors like product category, brand, and price tier influence this dynamic. The goal is to recommend a price that balances profit margins and sales volume, ensuring maximum profitability.

**Methodology:**

The methodology encompasses several key steps:

**Data Preprocessing:**

- Cleaning: Address missing values in 'sales' and 'cost' columns by imputing median values to maintain data integrity.

- Transformation: Ensure data types are consistent for analysis, especially for date-time fields.

**Analysis:**

**- OLS Technique:** Implement the Ordinary Least Squares (OLS) method to model the relationship between price and sales. This approach helps in predicting the impact of price adjustments on sales volume.

**- Price Recommendation:** Develop a `RecommendPrice` function that takes into account the SKU ID, sales data, time, and date to recommend an optimal price. This function integrates OLS findings to suggest prices that are expected to yield the highest profit margins.

**- Statistical Analysis:** Calculate mean, standard deviation, and unique item counts to understand data distribution and variance among products.

**Visualization:**

**A screenshot of a computer

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**- Price vs. Profit:** Visualize the relationship between price points and profit to identify trends and optimal pricing strategies.

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A graph of sales and sales

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**- Date Impact on Sales:** Analyze and visualize how sales are affected by dates, providing insights into seasonal trends, demand fluctuations, and optimal timing for price adjustments.

A graph showing a line

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**Results:**

**The analysis revealed:**

- A significant number of unique items, indicating a diverse product range.

- Variability in price and sold quantities across items, highlighting the need for a tailored pricing strategy.

- Seasonal and temporal impacts on sales, underscoring the importance of dynamic pricing strategies.

The `RecommendPrice` function successfully integrates these insights, recommending prices that align with market dynamics and profit optimization goals.

**Conclusion:**

The Retail Price Recommender system demonstrates the potential of data-driven strategies in optimizing retail pricing. By carefully analyzing sales data and employing statistical models, retailers can identify pricing strategies that maximize profits while maintaining competitive sales volumes. This project underscores the importance of leveraging analytics in decision-making processes, offering a blueprint for future enhancements and more sophisticated models.

**Future Directions:**

**- Enhanced Modeling**: Incorporate more complex models and machine learning algorithms to refine price recommendations.

**- Real-time Data Integration:** Adapt the system to utilize real-time sales data for dynamic pricing adjustments.

**- User Feedback Loop:** Implement mechanisms to gather customer feedback, further informing pricing strategies and adjustments.

This project represents a foundational step towards harnessing the power of data analytics in retail pricing strategies, offering scalable solutions for profit maximization in competitive markets.