Future Cart

AI Driven Demand Prediction

Project Overview

Project Statement:

In the world of e-commerce, demand forecasting is critical to achieve success. This project aims to create a demand forecasting model in an e-commerce business that predicts future product demand using time series analysis and multivariate regression based on historical sales data, as well as Google Analytics KPIs such as Google clicks and Facebook impressions, which are important indicators of customer interest.

Project Goals:

1. Build a robust demand forecasting model using time series analysis and multivariate regression to predict product demand accurately.
2. Integrate diverse data sources, including historical sales and Google Analytics KPIs, to enhance prediction accuracy.
3. Provide actionable insights for optimizing inventory, marketing strategies, and decision-making processes.
4. Design a scalable and user-friendly solution that adapts to dynamic e-commerce data and diverse product categories.

Project Outcomes:

- **Improved Inventory Management:** Accurate demand projections enable better inventory decisions, potentially minimizing stock-outs and surplus inventory.
- **Improved Marketing Efficiency:** Identify peak demand periods for targeted campaigns to optimize resource allocation.
- **Data-Driven Decision Making:** Reliable projections inform company choices, including pricing modifications and product promotions.
- **Accurate Demand Predictions:** Improve customer service by implementing an accurate demand prediction model.
- **Scalable Solution:** Create a scalable solution capable of handling massive datasets and diverse demand patterns across several goods.

Methodology

Data Preprocessing and Cleaning:

- Handled missing, duplicate, or inconsistent data entries to ensure data integrity and reliability.
- Identify and remove outliers to prevent skewed results and improve model accuracy.

Feature Engineering:

- Performing feature engineering to extract meaningful features that enhance prediction performance.
- New features added are:
    - 'Year-Month', 'MonthName', 'MonthNumber', 'Day_of_week', 'Day_number', 'Week_of_Month', 'Weekend', 'December', 'January', 'February', 'March', 'April', 'May', 'June', 'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday', 'Sunday'