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Final Project

PROJECT TITLE

Store Item Demand Forecasting

AGENDA

The agenda for the store item demand forecasting project involves several key steps. Firstly, defining the project scope and objectives, including the specific items to be forecasted and the time horizon. Secondly, gathering historical sales data and any relevant external factors that may influence demand, such as seasonality or promotions. Thirdly, selecting and implementing appropriate forecasting models, considering factors like data granularity and computational resources. Fourthly, validating the models using appropriate evaluation metrics and adjusting them as necessary. Lastly, deploying the final forecasting solution and establishing a process for monitoring and updating the models to ensure accuracy and effectiveness over time.

PROBLEM STATEMENT

- The challenge lies in accurately predicting the demand for various items in a store to optimize inventory management and ensure customer satisfaction. Despite having access to historical sales data, the fluctuating nature of consumer preferences, seasonal trends, and unforeseen events make forecasting challenging. This project aims to develop robust forecasting models that can anticipate future demand with high accuracy, taking into account various influencing factors. The ultimate goal is to minimize stockouts, reduce excess inventory costs, and improve overall operational efficiency for the store.

PROJECT OVERVIEW

The store item demand forecasting project aims to develop and implement a reliable system for predicting the demand for various items in a store. Leveraging historical sales data and relevant external factors, such as seasonality and promotions, the project seeks to build forecasting models that can accurately anticipate future demand. By doing so, the project aims to optimize inventory management, reduce stockouts, minimize excess inventory costs, and enhance overall operational efficiency. The project will involve data collection, model development, validation, and deployment, with a focus on continuous monitoring and improvement to ensure the accuracy and effectiveness of the forecasting solution over time.

WHO ARE THE END USERS?

- Store managers
- Inventory managers
- Supply chain managers
- Sales and marketing teams
- Finance department
- Executive management team

Solution and Proportion:

Data Collection and Preprocessing: Gather historical sales data and relevant external factors.
Feature Engineering: Extract essential features from the data, such as time trends and seasonality patterns.
Model Selection and Development: Choose appropriate forecasting models (e.g ., ARIMA, machine learning algorithms) and fine-tune them.
Validation and Evaluation: Assess model performance using metrics like Mean Absolute Error or Root Mean Squared Error.
Deployment and Integration: Integrate models into existing systems and establish processes for regular forecast updates.
Monitoring and Maintenance: Implement mechanisms to track system accuracy and adjust models as needed.

THE WOW IN YOUR SOLUTION

- **Data Collection**: Gather historical sales data and relevant external factors.
- **Model Development**: Choose forecasting models and fine-tune them.
- **Deployment**: Integrate models into existing systems.
- **Monitoring**: Track system accuracy and adjust models as needed.

- **Validation**: Evaluate model performance using metrics.

MODELLING

1. **Time Series Models**
    i. ARIMA
    ii. Exponential Smoothing Methods

2. **Machine Learning Models**
    i. Linear Regression
    ii. Random Forest
    iii. Gradient Boosting Machines (GBM)
    iv. Neural Networks
3. **Hybrid Models**
    i. Ensemble Methods
    ii. AutoML Tools

RESULTS

The demand forecasting project yielded substantial benefits. By using advanced modeling techniques, it enabled precise predictions of future demand for store items. This accuracy improved inventory management, reducing stockouts and excess inventory costs. Consequently, customer satisfaction increased with consistently available products, fostering loyalty. Additionally, the system optimized the supply chain, enhancing efficiency in procurement, production planning, and distribution. These improvements led to cost reductions, particularly in inventory carrying costs and lost sales. With data-driven insights guiding decision-making, businesses could strategically adjust pricing, promotions, and resource allocation. Continuous monitoring ensured ongoing refinement, perpetuating enhanced operational efficiency and profitability.

Demo Link