ALPHA STORE

A Case Study of Predictive Forecasting and Inventory Management

-- Business Introduction --

Alpha Store operates a chain of stores across the region, offering a diverse range of products (grocery, toys, clothing, electronics and furniture) to meet the evolving needs of customers.

With a strong commitment to data-driven decision-making, Alpha Store dedicated to leveraging advanced analytics to optimize operations and enhance customer satisfaction.

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-- PROBLEM STATEMENT --

Alpha Store faces significant operational challenges due to the dynamic nature of consumer demand and external market volatility in the U.S. retail sector. Fluctuations in sales volumes—driven by seasonal buying patterns, promotional campaigns, and economic shifts—directly disrupt inventory management, staffing efficiency, and profit margins.

Alpha Store is particularly affected by demand volatility, where seasonal spikes and sudden market shifts lead to stockouts or overstocks.

-- Rationale for the Project—

(What is the Importance of the project to the business)

- **Enhanced decision-making:** Accurate sales demand forecasts will empower Nova Mart to make informed, data-driven decisions in response to market changes.
- **Operational efficiency:** The forecasting system will improve production planning, allowing the company to adjust operations based on anticipated price fluctuations.
- **Risk mitigation:** By predicting demand, Eagle Energy can reduce the risk of unanticipated costs and safeguard profitability.
- **Improved procurement:** Forecasting enables better timing for purchasing, ensuring optimal pricing and inventory levels.

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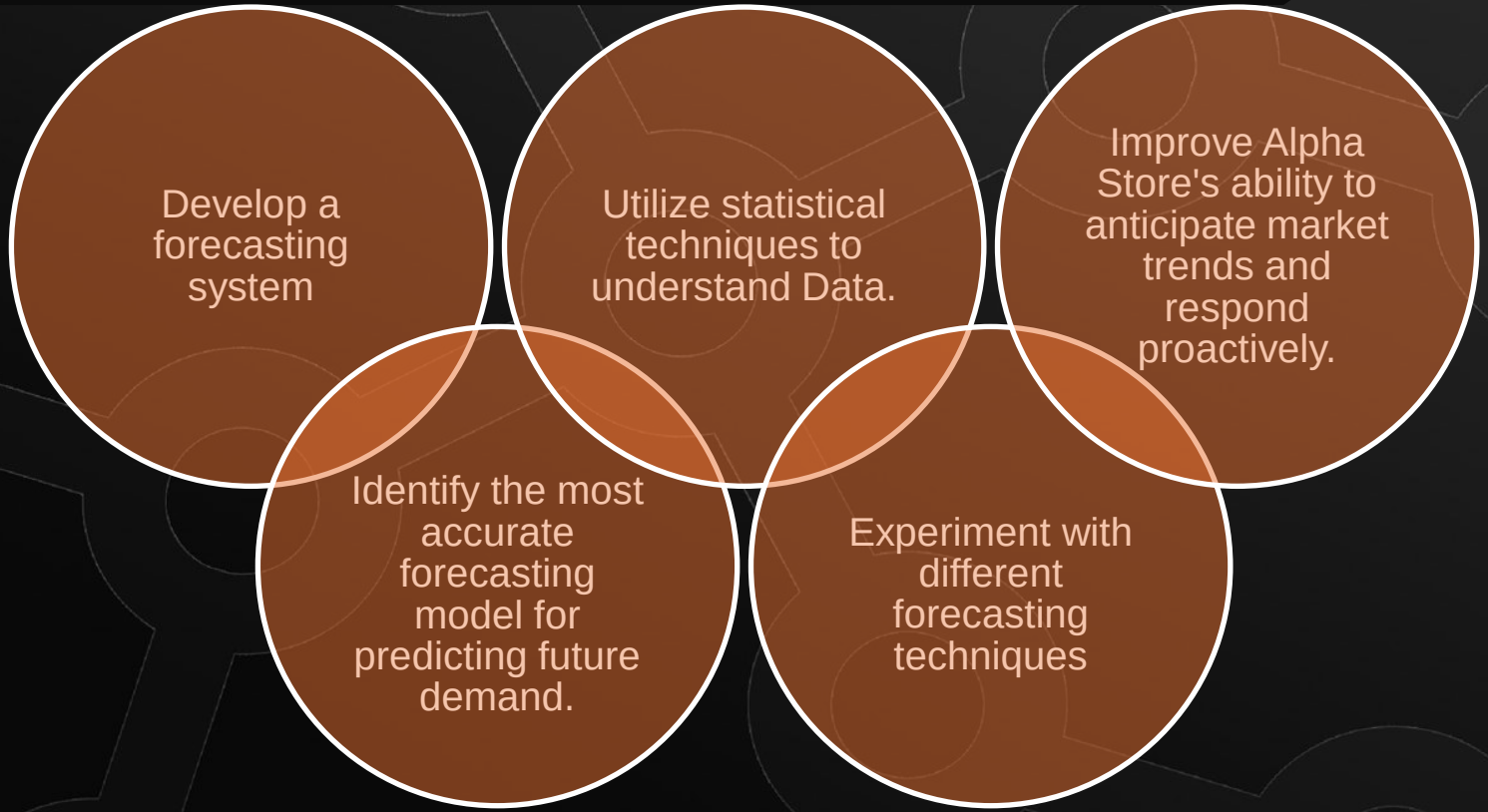
--Specific Objectives --



-- Data Description --

Date: Daily records.

Store ID & Product ID: Unique identifiers for stores and products.

Category: Product categories like Electronics, Clothing, Groceries, etc.

Region: Geographic region of the store.

Inventory Level: Stock available at the beginning of the day.

Units Sold: Units sold during the day.

Price: Price sold during the day.

Discount: Discount of price.

Competitor Price: Price of substitute goods.

Weather Condition: Daily weather impacting sales.

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TECH STACK

DESCRIPTIVE STATISTICS

CHARTS & VISUALIZATION

FORECAST

EVALUATION OF RESULT

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PROJECT WORKFLOW

Understand business expectations and objectives

Data Understanding & Preparation

Building Visualizations

Exploratory Data Analysis and Descriptive Statistics

Data Forecast

Evaluation and Review

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FORECATING TECHNIQUES

❑ NAIVE APPROACH

The naive forecasting method assumes that the forecast for the next period will be equal to the most recent actual value. It is a simple and quick method but may not be very accurate, especially for data with trends or seasonal patterns

❑ MOVING AVERAGE

The moving average method calculates the average of sales over a specific number of periods and uses it as the forecast for the next period. This technique smooths out short-term fluctuations and highlights longer-term trends or cycles.

❑ EXPONENTIAL SMOOTHING

Exponential smoothing assigns exponentially decreasing weights to with no clear trend or seasonal pattern, providing a balance between recent and older data points.

❑ LINEAR FORECASTING

Linear forecasting uses a linear trend line to predict future sales. It assumes that the trend observed in the historical data will continue into the future. This method is useful when the data shows a clear upward or downward trend.

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