PRODUCT SALES ANALYSIS

ABSTRACT

The product sales analysis is a critical component of any business strategy, aiming to provide insights into the performance of specific products within a company's portfolio. This analysis involves the systematic examination of sales data to understand trends, patterns, and opportunities for improvement. By conducting a thorough product sales analysis, businesses can make informed decisions to optimize their product offerings and boost profitability

OBJECTIVES

- Sales Performance Evaluation: Assess how well a product is selling in terms of revenue and quantity.
- Market Penetration: Determine the market share of the product and identify opportunities for growth.
- Customer Segmentation: Analyze the types of customers buying the product to tailor marketing strategies.
- Trend Identification: Identify sales trends over time, such as seasonality or cyclical patterns.
- Competitor Benchmarking: Compare the product's performance with competitors to gain a competitive edge.

DESIGN THINKING

- Data Collection
- Data Preprocesing
- Exploratory Data Analysis(EDA)
- Insights
- Recommendation

Data Collection

- Identify Data Sources: Determine where you'll get your data. This can include sales records, POS systems, online sales platforms, and more. Ensure you have access to the necessary data.

- Data Selection: Decide which specific data points are essential for your analysis. Common data includes sales date, product ID, price, quantity sold, customer information, and location.

- Data Gathering: Collect the data from your chosen sources. This may involve exporting data from databases, downloading reports, or using APIs if applicable.

- Data Cleaning: Clean and preprocess the data. This includes handling missing values, removing duplicates, and converting data types as needed.

Data Preprocessing

- Data Cleaning:
  Remove duplicates.Handle missing values (e.g., by imputation or removal).Correct any inconsistencies or errors in the data.

- Data Integration:
  Combine data from multiple sources if necessary.

- Data Transformation:
  Convert data types as needed (e.g., date formatting, numeric conversion).Normalize or scale numeric features.Encode categorical variables (e.g., one-hot encoding).

- Feature Engineering:
  Create new features that might be relevant (e.g., calculating total sales, average sales per day).Extract meaningful information from text data (e.g., product descriptions).

- Outlier Detection:
  Identify and handle outliers that could skew the analysis.

Exploratory Data Analysis

- Summary Statistics: Calculate basic statistics like mean, median, mode, standard deviation, and quartiles for numerical variables (e.g., sales, price).

- Data Visualization: Create various plots and charts to visualize your data. Common ones include:Histograms to understand the distribution of sales or price.Box plots to identify outliers and distribution characteristics.Time series plots if your data has a temporal component.Scatter plots to explore relationships between variables (e.g., sales vs. price).Bar charts to visualize categorical variables (e.g., product categories).

- Correlation Analysis: Calculate correlation coefficients between numerical variables to identify relationships. For instance, you can check if there's a correlation between price and sales.

- Seasonality and Trends: If your data is time-series, look for seasonality and trends. You can use techniques like moving averages or decomposition to analyze these patterns.

Insights

- Seasonal Trends: Identify seasonal patterns in sales, which can help with inventory planning and targeted marketing during peak seasons.
- Top-Selling Products: Determine which products consistently generate the highest sales and focus on optimizing their performance.
- Customer Segmentation: Discover different customer segments based on purchasing behavior, demographics, or geography. Tailor marketing strategies to each segment's preferences.
- Product Performance Over Time: Analyze how individual products or product categories have performed over time, identifying growth or decline trends.

Recommendation

- Define Objectives: Clearly outline the objectives of your analysis. Whether it's identifying top-performing products, optimizing pricing, or improving customer retention, having clear goals will guide your analysis.

- Data Quality Check: Ensure data accuracy and completeness. Cleanse the data by addressing duplicates, missing values, and outliers to avoid skewed results.

- Utilize Descriptive Statistics: Begin with descriptive statistics to understand the basic characteristics of your sales data. This includes mean, median, standard deviation, and quartiles.

- Visualize Sales Trends: Use visualizations like line charts or bar graphs to depict sales trends over time. This can help identify seasonal patterns, sales spikes, or declining trends.

Algorithms

- SVM - Support Vector Machine
- Ridge Classifier
- Random forest
- XG Booster

Support Vector Machine

SVM - Support Vector Machine is a supervised machine learning technique used for classification and regression. Finding a hyperplane in an N-dimensional space that classifies the data points is the goal of the SVM method. The number of features determines the hyperplane's size.

Ridge Classifier

Ridge classification is a method used in machine learning to assess linear discriminant models. In order to prevent overfitting, this type of normalization limits model coefficients.

Random Forest

Random Forest is a classification algorithm that uses multiple decision trees on smaller sets of the input dataset and averages the results to enhance the dataset's prediction accuracy.

XG Booster

Formally speaking, XGBoost may be described as a decision tree-based ensemble learning framework that uses Gradient Descent as the underlying objective function. It offers excellent flexibility and efficiently uses computation to produce the mandated results.

Conclusion

The product sales analysis project has provided valuable insights and actionable recommendations to enhance our understanding of our sales performance and guide strategic decision-making and equipped us with the knowledge and tools to make data-driven decisions that will optimize our sales strategies, improve customer satisfaction, and drive sustainable business growth. Continuous monitoring and adaptation will be key to ensuring that our strategies remain effective in a dynamic market environment.

THANK YOU