

Data Science Project Report

Introduction

This project aims to optimize product pricing in a supermarket chain. The main goal is to maximize sales volume by analyzing the impact of pricing strategies and promotions. The analysis uses simulated sales data to evaluate the relationship between pricing, promotions, and sales volume.

The importance of this analysis lies in helping businesses adjust pricing strategies to increase revenue and competitiveness.

Methodology

The project follows a structured data science workflow, which includes the following steps:

1. **Data Generation:** Simulated data representing prices, promotions, and sales volume.
2. **Data Cleaning:** Handle missing values, outliers, and transform variables as needed.
3. **Exploratory Data Analysis (EDA):** Analyze the distribution of sales volume and the impact of pricing strategies.
4. **Modeling:** A linear regression model is trained to predict sales volume based on pricing and promotion data.
5. **Evaluation:** The model's performance is evaluated using Mean Squared Error (MSE) and R-squared (R²) metrics.

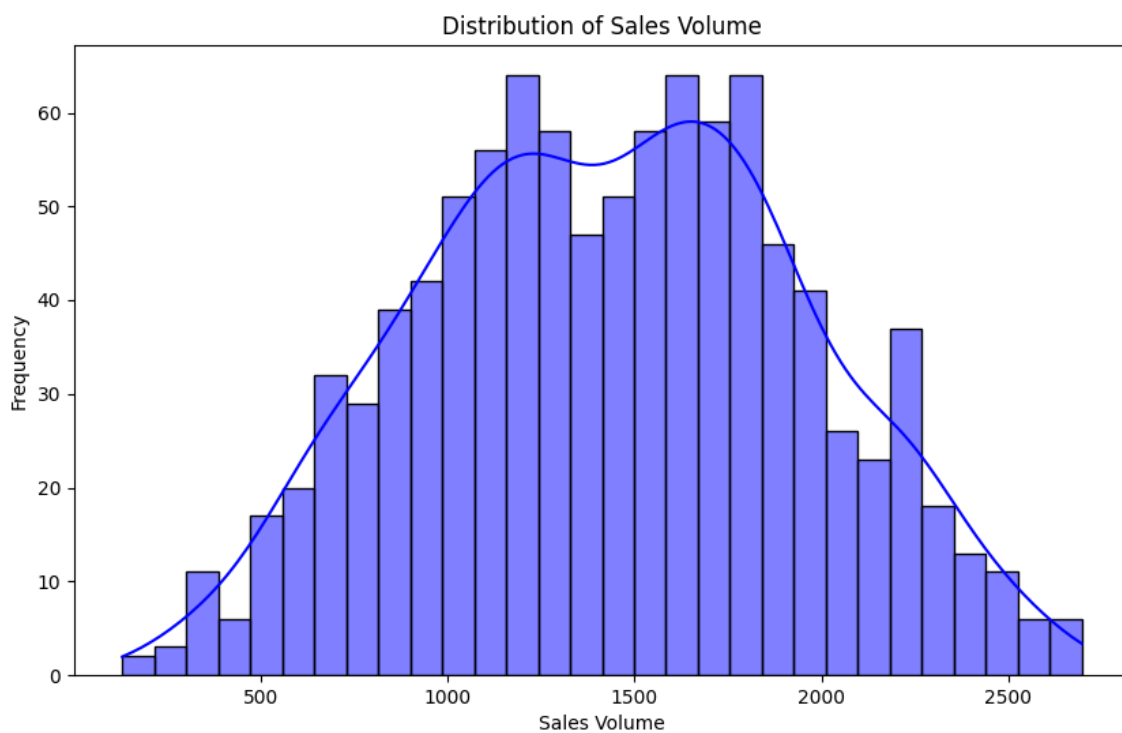
Analysis & Results

The analysis reveals a strong relationship between pricing, promotions, and sales volume. The linear regression model shows that changes in pricing significantly affect sales, while promotions positively impact volume. The model achieved the following metrics:

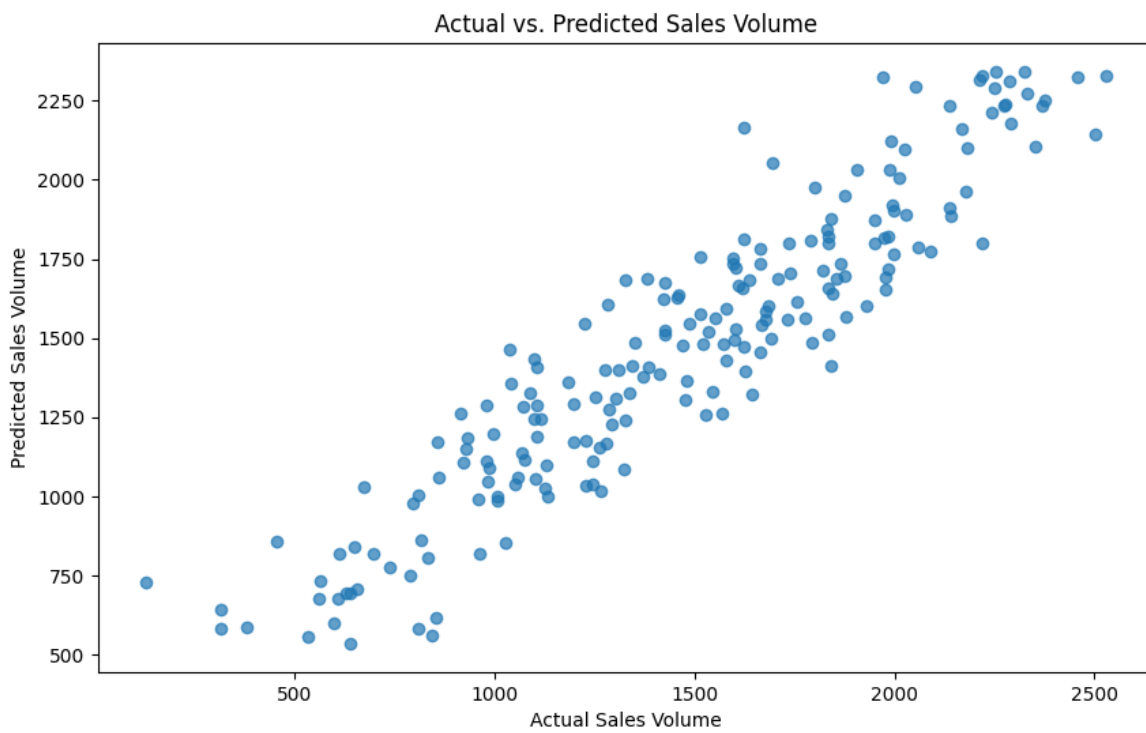
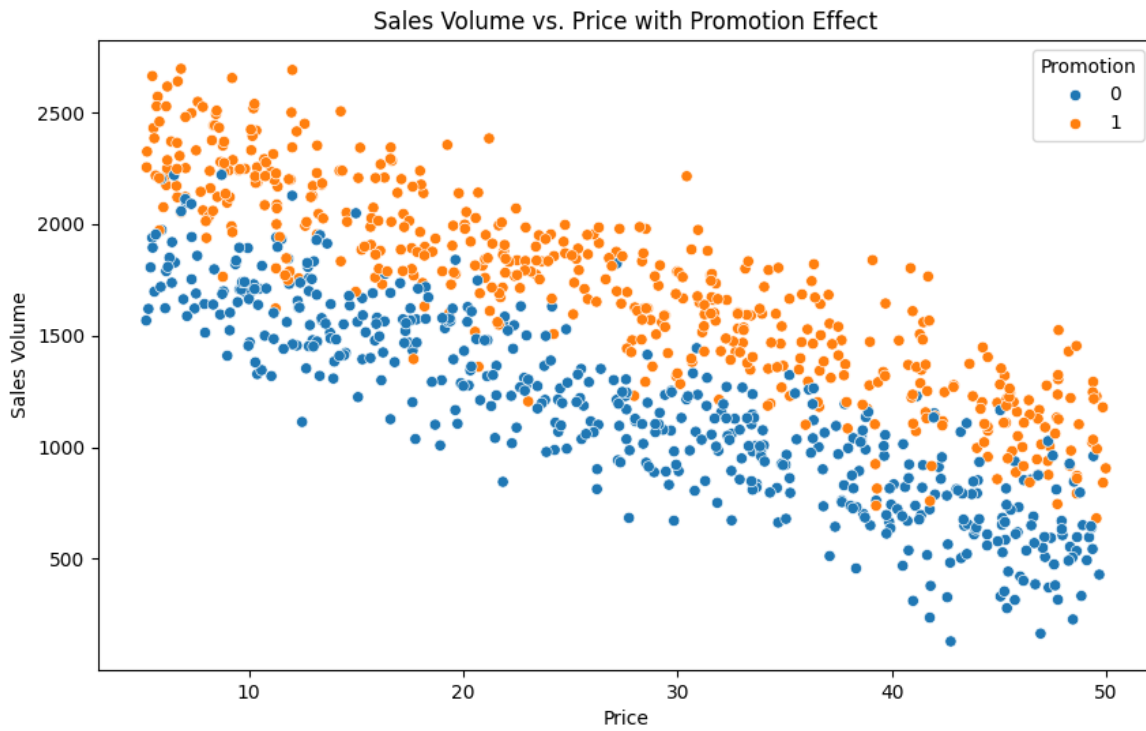
Data Science Project Report

- **Mean Squared Error (MSE):** Measures the average squared difference between actual and predicted values.
- **R-squared (R^2):** Represents the proportion of variance explained by the model, indicating the model's effectiveness.

Below are the visualizations generated during the analysis:



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Conclusions & Recommendations

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The analysis suggests that adjusting prices while leveraging promotions can enhance sales performance. Key recommendations include:

- Implement dynamic pricing strategies based on consumer demand and competitor pricing.
- Use promotions selectively to boost sales volume without significantly reducing profitability.
- Explore further analysis by including seasonal effects and other product features.

These insights provide a roadmap for the business to optimize pricing strategies and achieve better sales results.