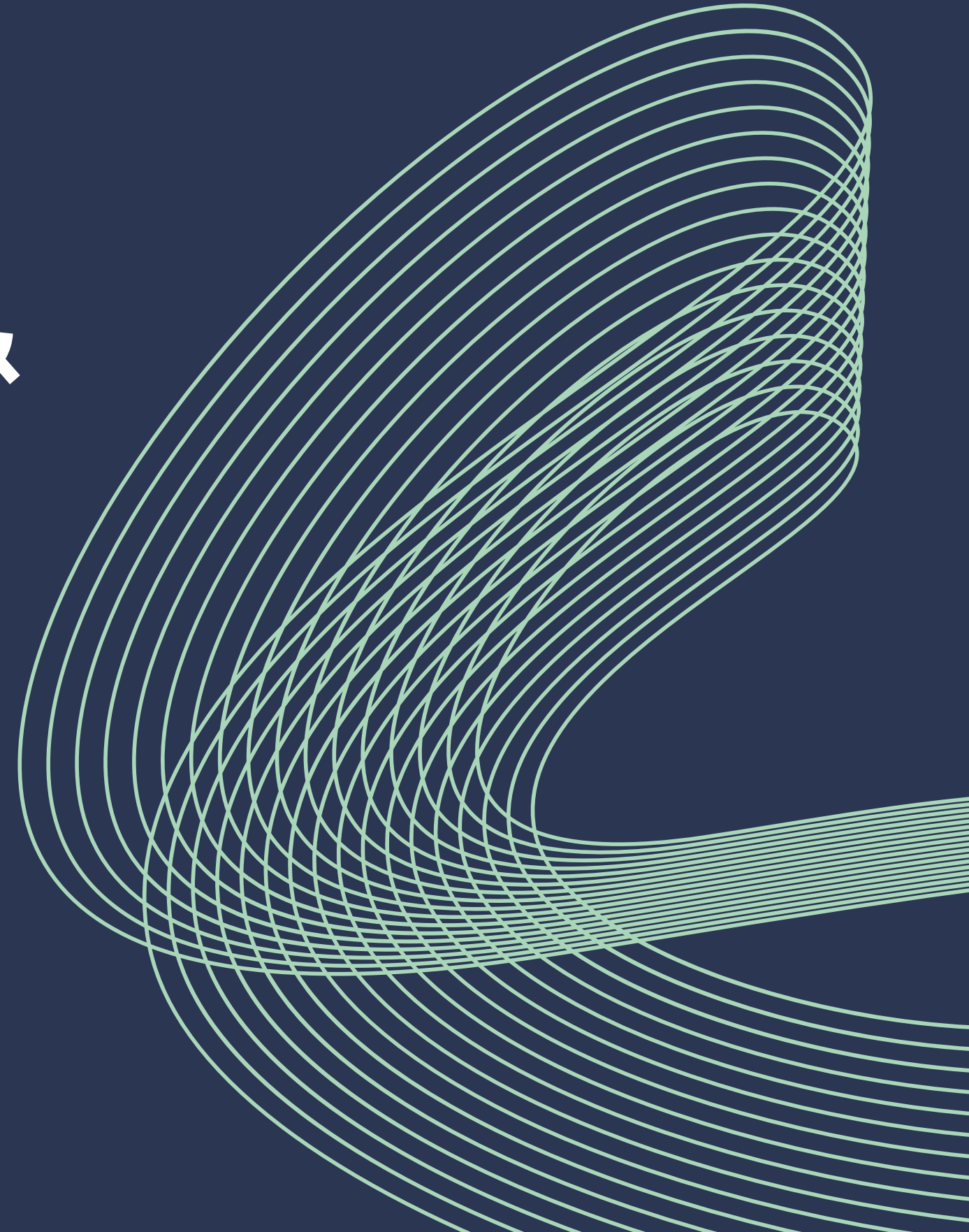

PRODUCT CLUSTERING & SALES FORECASTING

PRESENTED BY

Dimas Putra Hendika



INTRODUCTION

This project explores the Superstore sales dataset to uncover actionable insights about product performance, profitability, and future sales trends using data science techniques like clustering, regression, and forecasting.

Business Questions

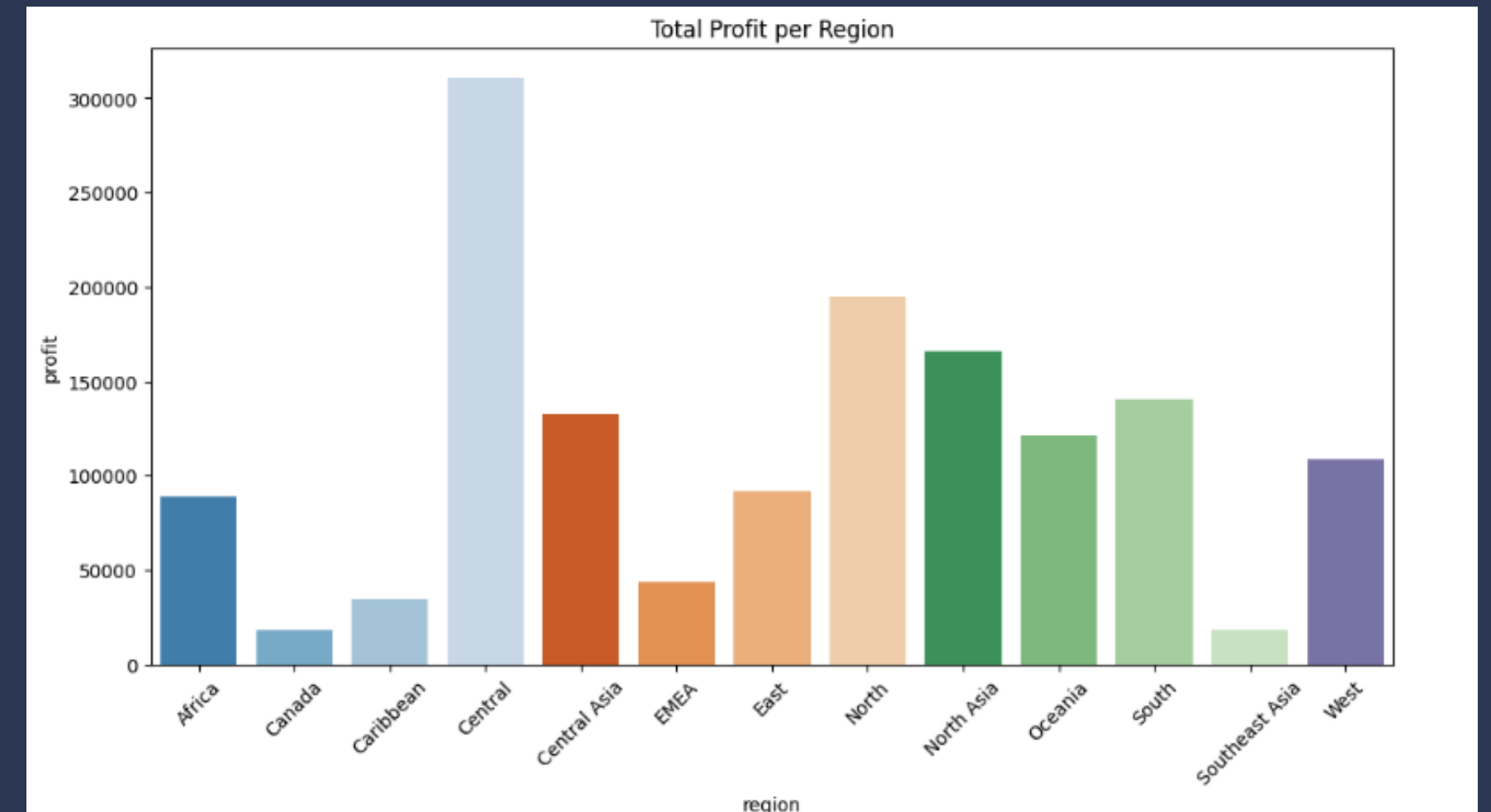
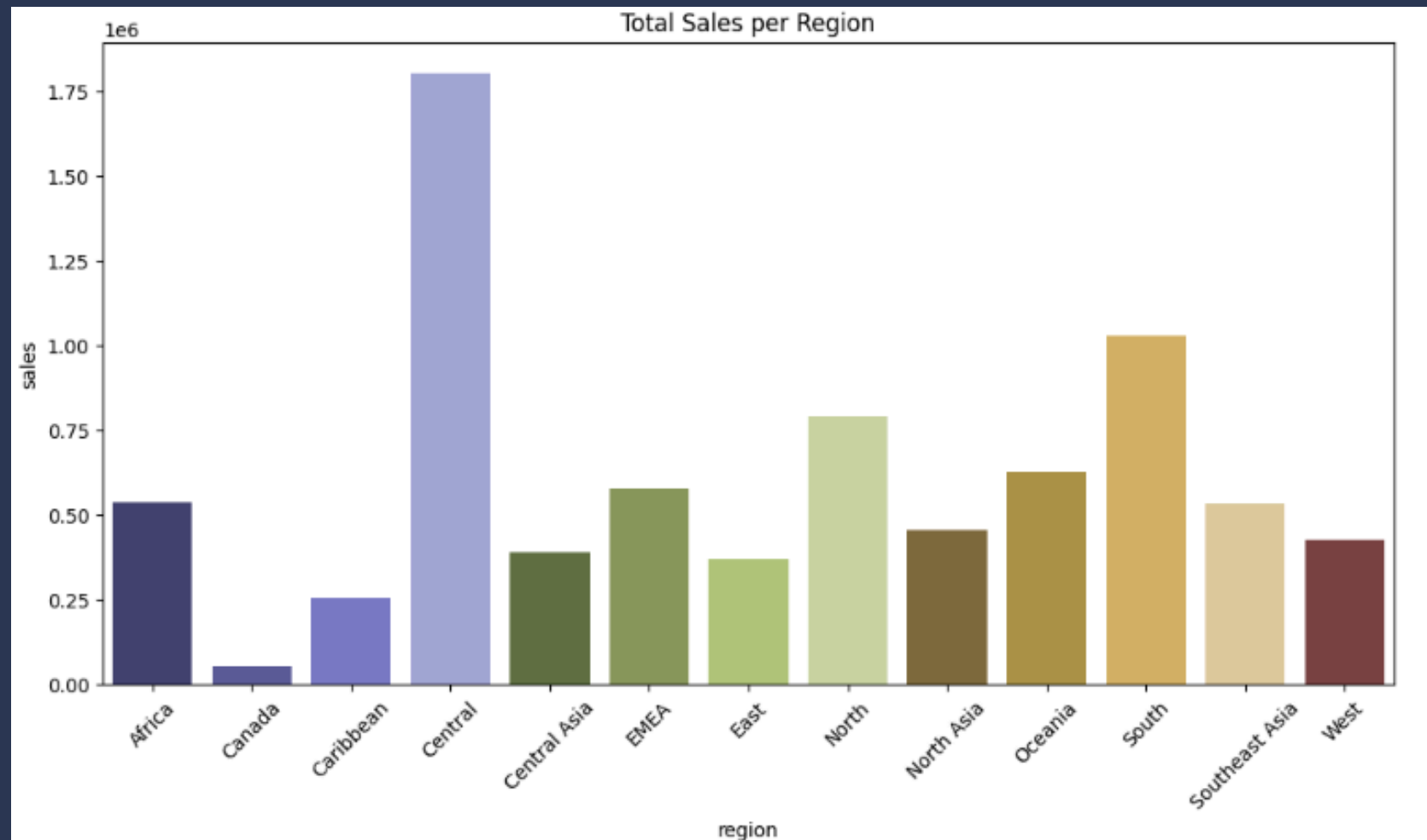
- What is the impact of discounts on profit?
- How can we segment products based on sales and profitability?
- How can we forecast future sales while considering trends and seasonality?
- What strategic recommendations can be made based on the analysis?

SALES OVERTIME



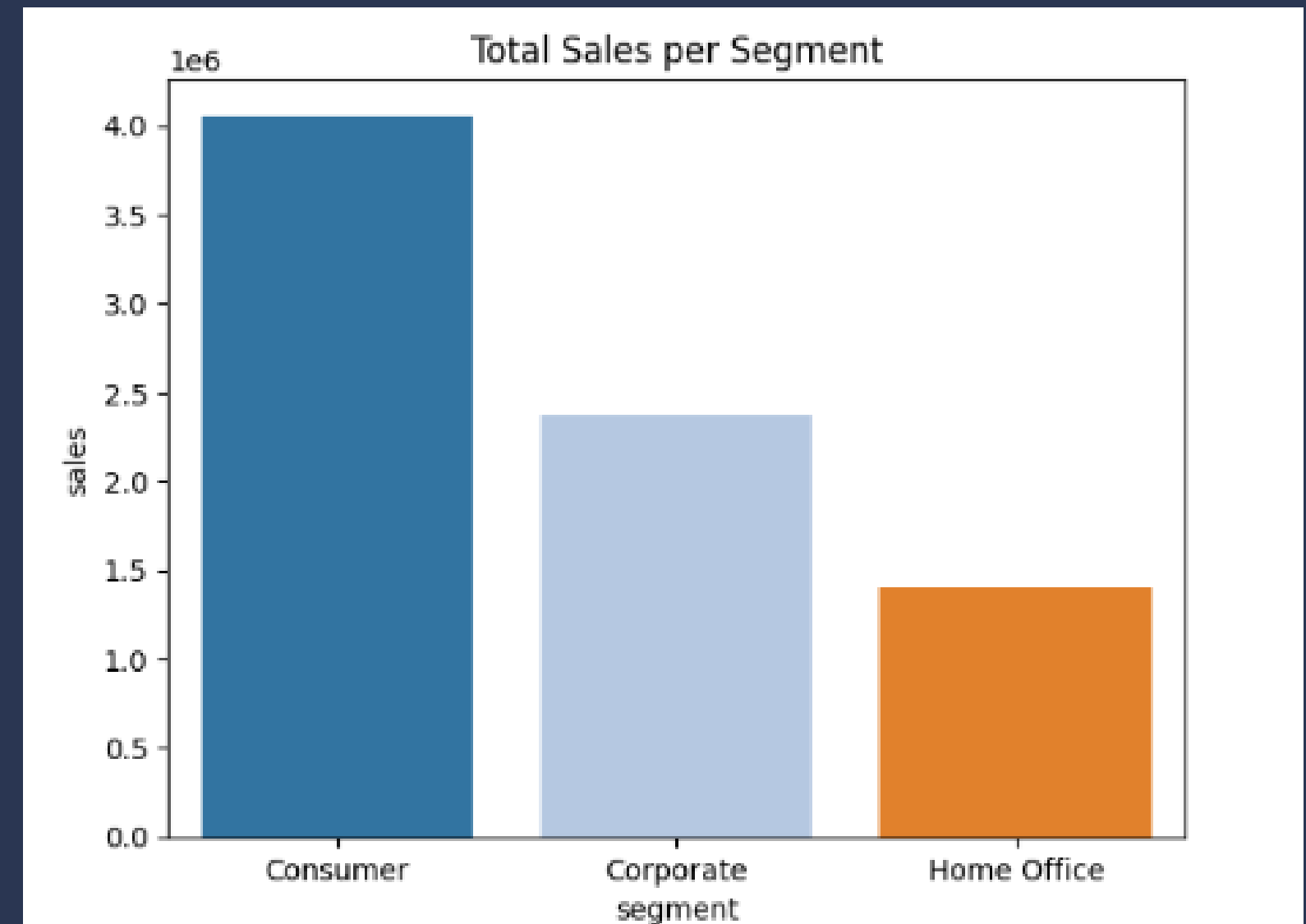
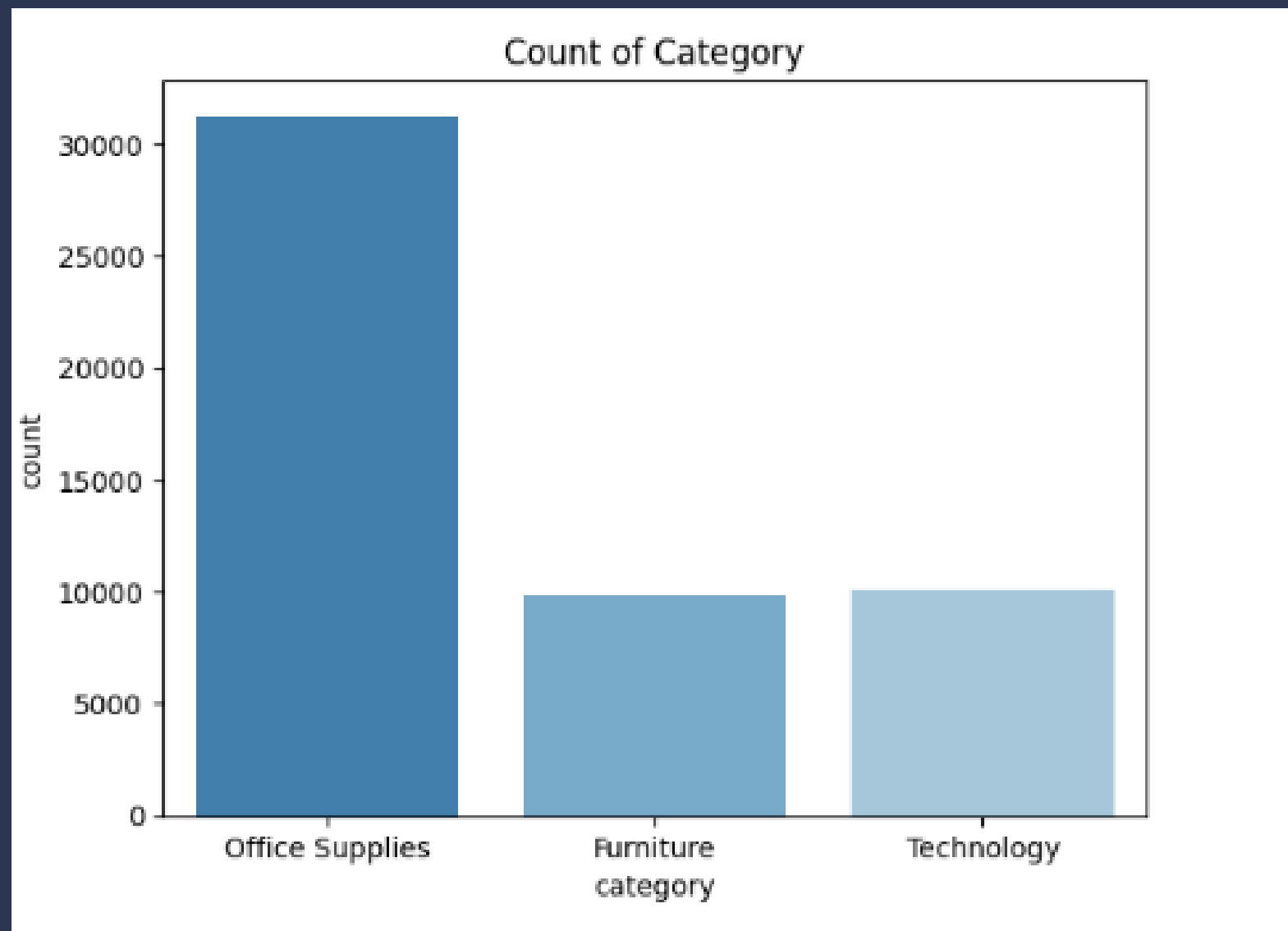
Sales show consistent growth year-over-year with strong seasonal patterns. Peaks occur in holiday months (Nov-Dec), while Jan-Feb are low seasons.

REGIONAL PERFORMANCE



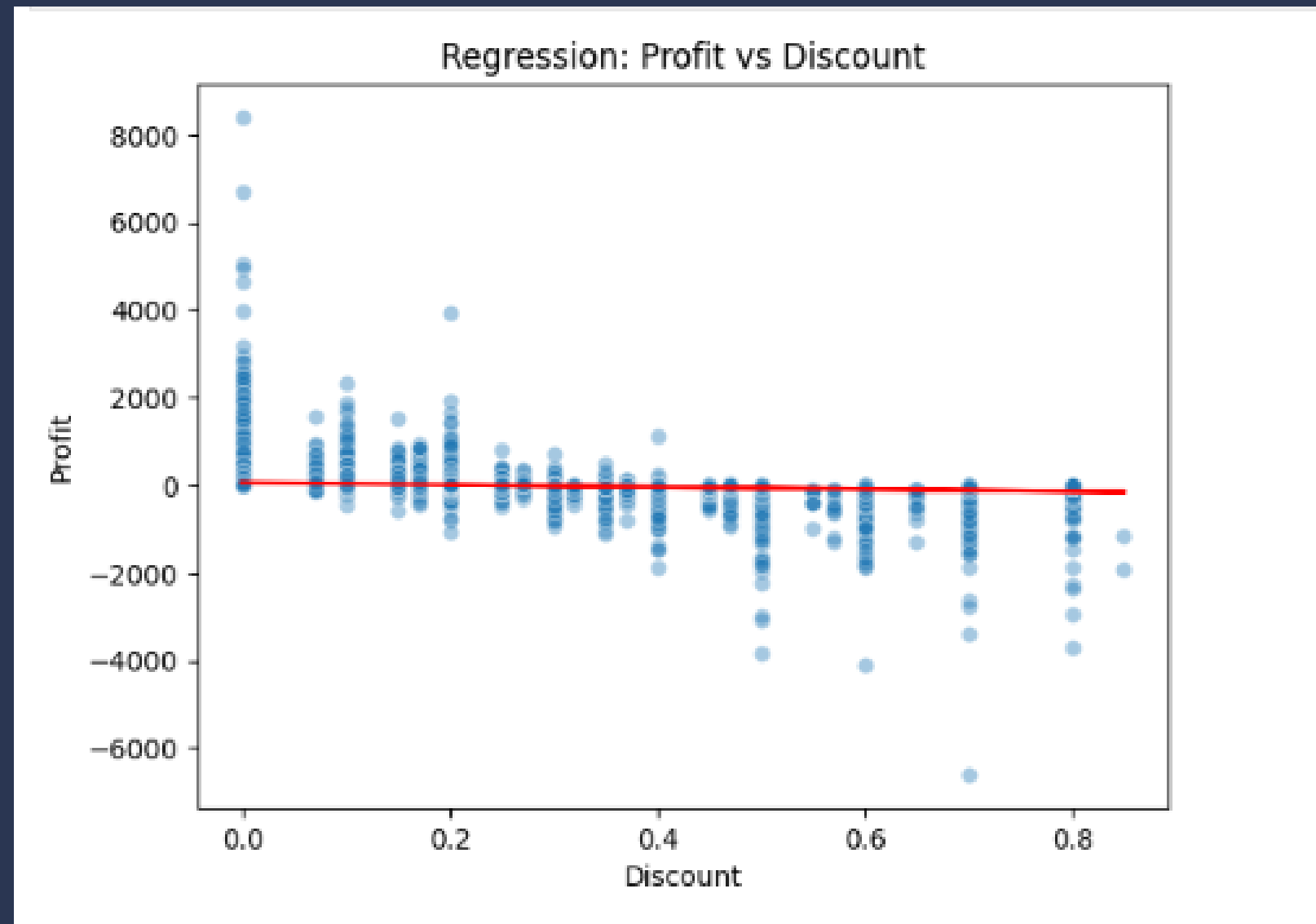
CENTRAL REGION LEADS IN BOTH SALES AND PROFIT. SOUTH HAS HIGH SALES BUT LOWER PROFIT THAN NORTH. SOUTHEAST ASIA AND CANADA UNDERPERFORM.

PRODUCT CATEGORIES VS. SEGMENTS



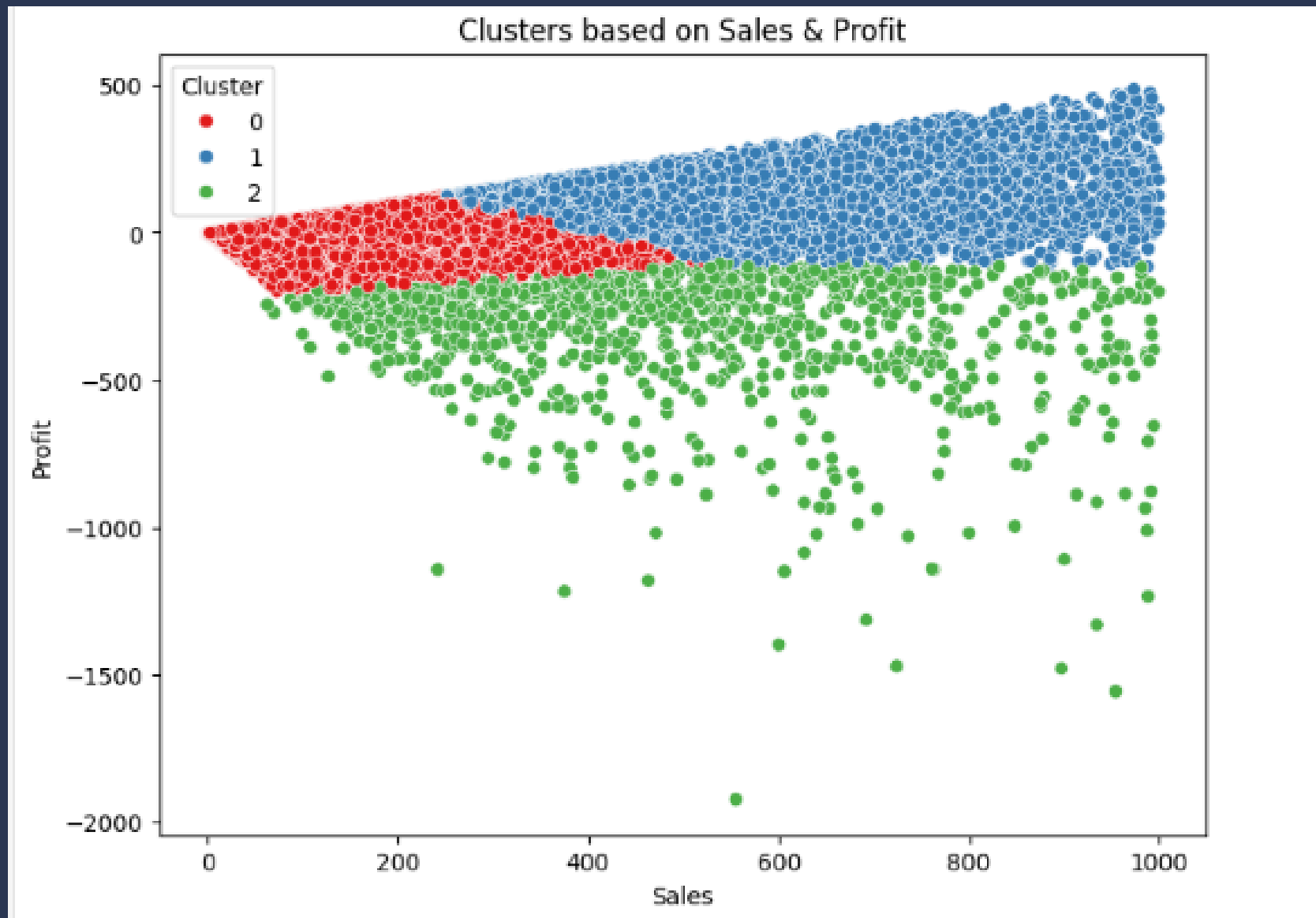
OFFICE SUPPLIES DOMINATE IN VOLUME, WHILE CONSUMER IS THE TOP REVENUE DRIVER. HOME OFFICE LAGS SIGNIFICANTLY.

IMPACT OF DISCOUNTS ON PROFIT (LINEAR REGRESSION)



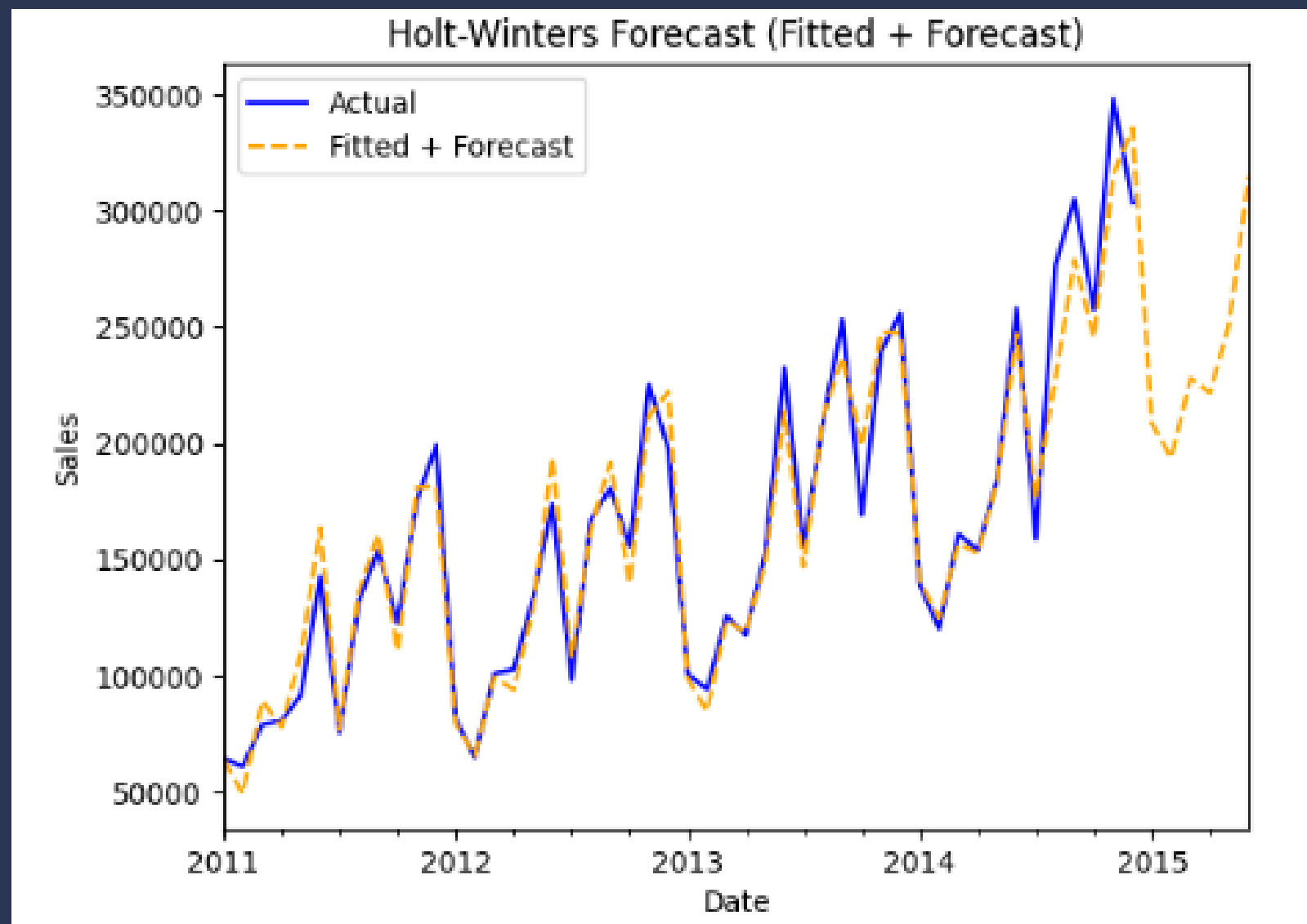
- Linear regression shows a negative relationship between discount and profit. A 1% increase in discount reduces average profit by \$2.60.
 - Excessive discounting can hurt margins. Strategy should balance volume and profitability.
-

PRODUCT CLUSTERING (KMEANS)



- Products were clustered into three groups based on sales and profit.
 - Cluster 0: Low Sales - Low Profit
 - Cluster 1: High Sales - High Profit
 - Cluster 2: High Sales - Low Profit

SALES FORECASTING (HOLT-WINTERS)



- Holt-Winters forecasting reveals an upward trend with clear seasonality.
- Sales are expected to peak in mid-year and drop in early Q1.

KEY INSIGHTS AND RECOMMENDATIONS

Key Insight

- Sales increased every year from 2011 to 2014
- Strong seasonality: Nov-Dec peaks, Jan-Feb dips
- Central region is the best performer; South needs margin optimization
- Office Supplies dominate in count; Consumer drives most revenue
- Clusters reveal product opportunities and risks
- Forecast supports proactive planning for 2015

Recommendation

- Optimize discount strategy to protect profit margins.
 - Focus on Central and Consumer segments as top performers.
 - Improve South and Home Office performance through pricing and marketing.
 - Discontinue or revamp underperforming products identified via clustering.
 - Plan for seasonal peaks in Nov-Dec and prepare for Q1 dips.
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APPENDIX

- Click the link below to access the full code and dataset:
- <https://github.com/Dimashendika/Product-Clustering-and-Sales-Forecasting-with-Machine-Learning>

