

# **EXPLORATORY DATA ANALYSIS**

## DETAILS

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## OBJECTIVE OF THE ANALYSIS

- Understanding sales trends over time.
- Identifying key factors impacting sales.
- Examining seasonal variations and promotional effectiveness.
- Providing data-driven insights for business decisions.



# OVERVIEW OF THE DATASET

TOTAL RECORDS: 1218

## KEY VARIABLES

- Sales, Product, Date, Price Discount (%), Promotional Activities, Google Mobility Trends
- Holiday flags were dropped due to insignificance.



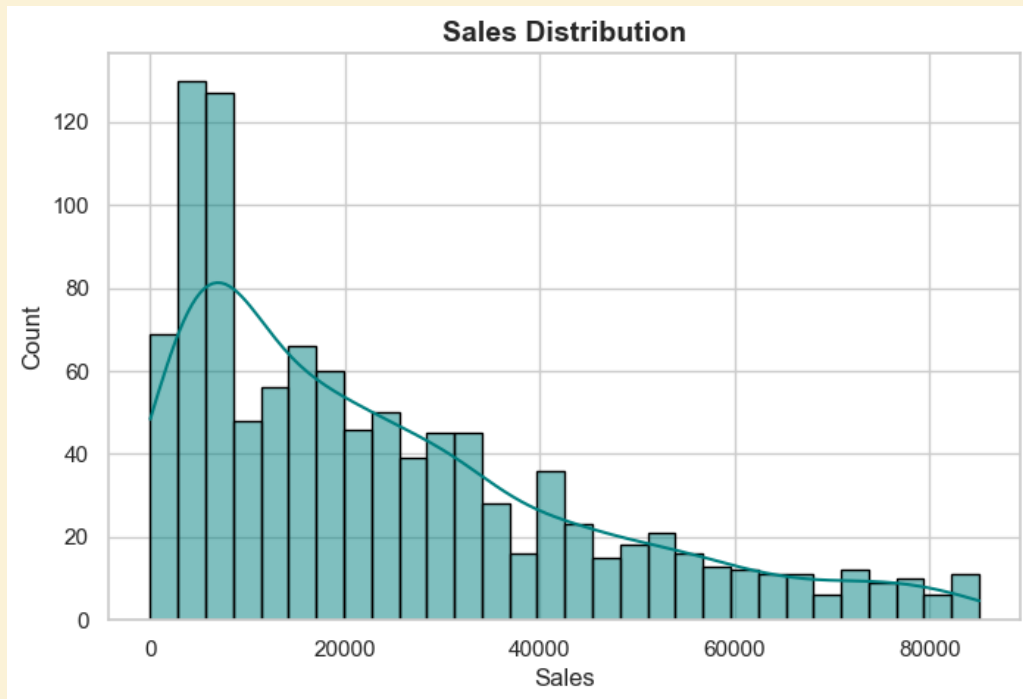
# VISUALIZATIONS

## SALES TRENDS OVER TIME



- Sales show periodic peaks and declines
- Highest sales peaked in mid 2018 & 2019
- Need to perform further investigation for underlying factors

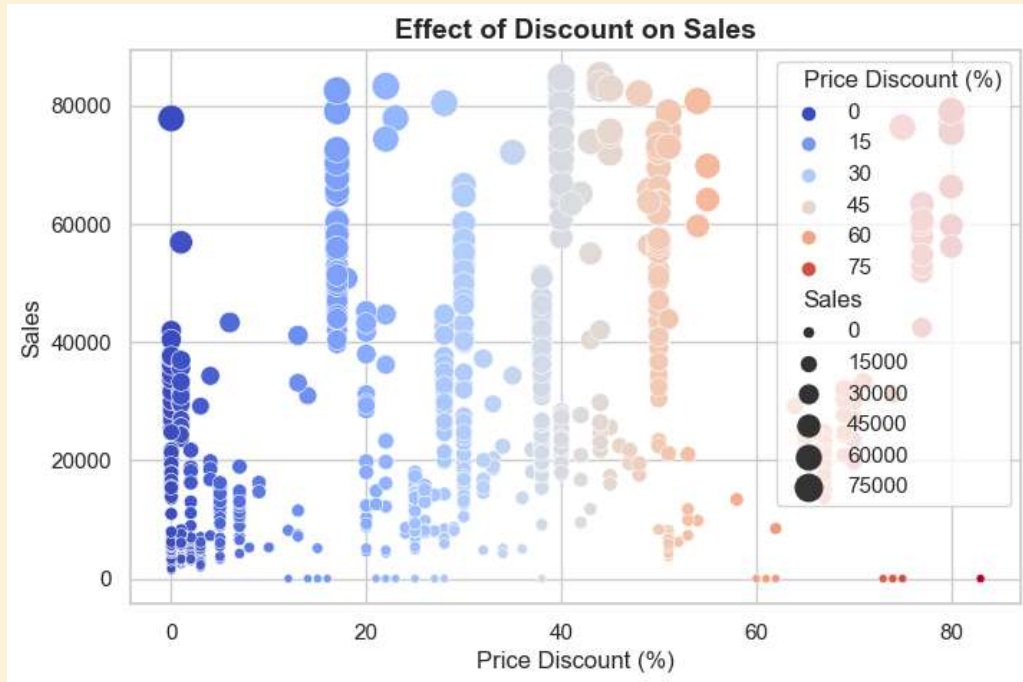
## DISTRIBUTION OF SALES



- Sales are right-skewed, indicating the presence of high-value sales outliers
- Majority of sales cluster around 20000 to 40000

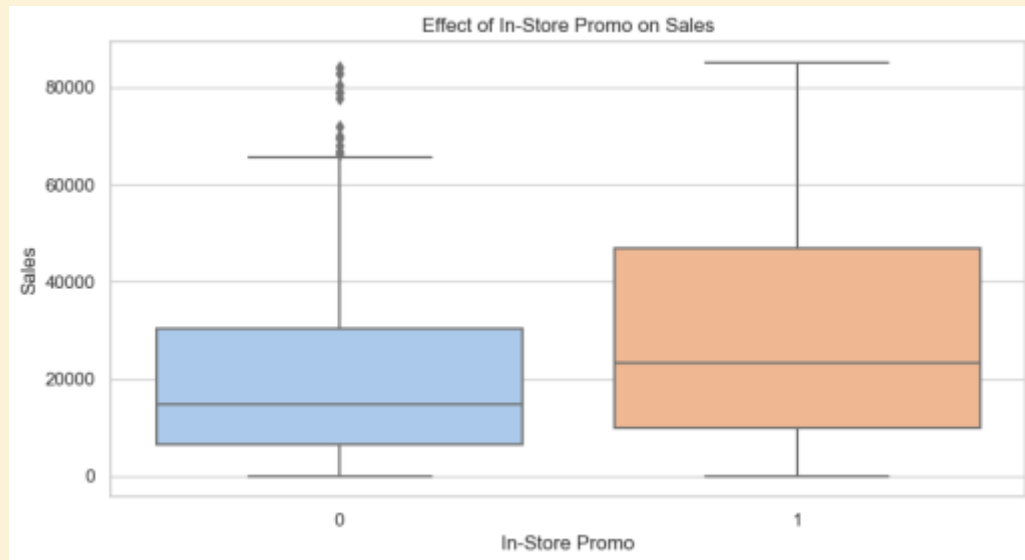


## IMPACT OF DISCOUNTS ON SALES



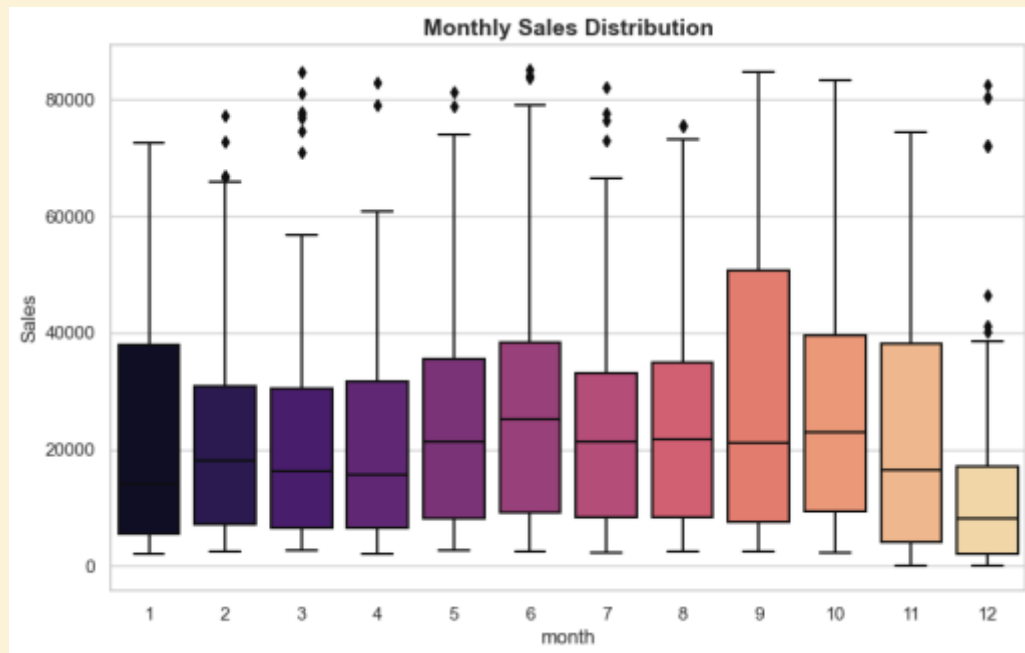
- Discounts always do not guarantee higher sales
- Some discount ranges might have optimal effectiveness such as 40% to 80%

## PROMOTIONAL ACTIVITIES AND SALES



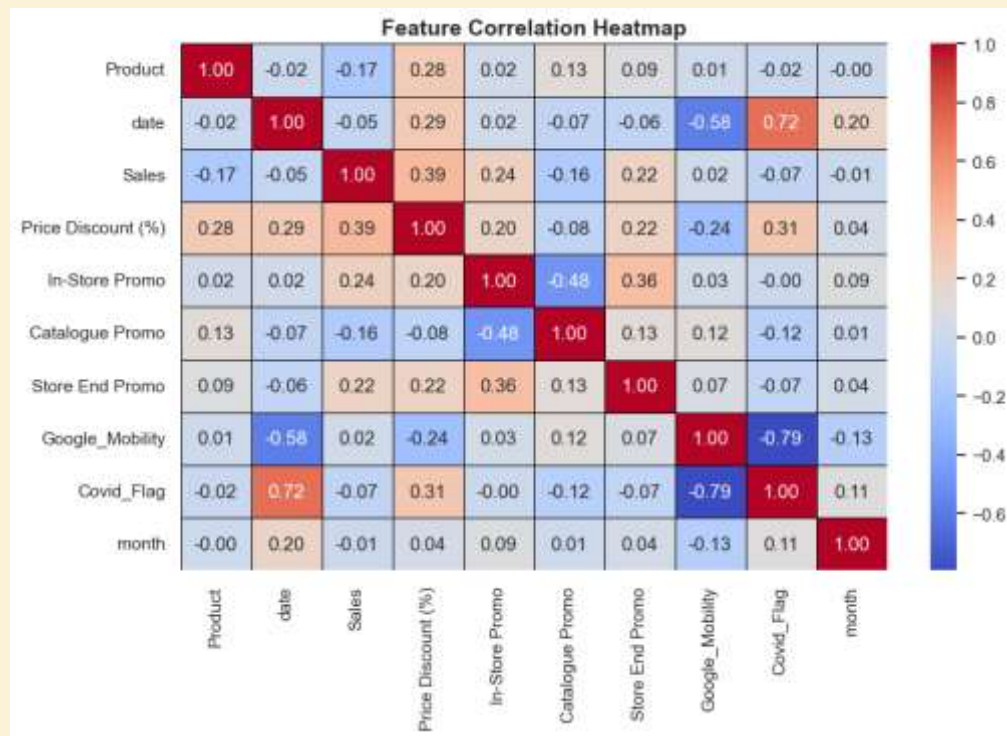
- Sales tend to be higher during promotions
- However, the effectiveness of different promotional strategies needs further exploration

## SEASONAL SALES ANALYSIS



- Certain months exhibit higher sales, possibly due to demand cycles
- Understanding seasonality helps in inventory and market planning

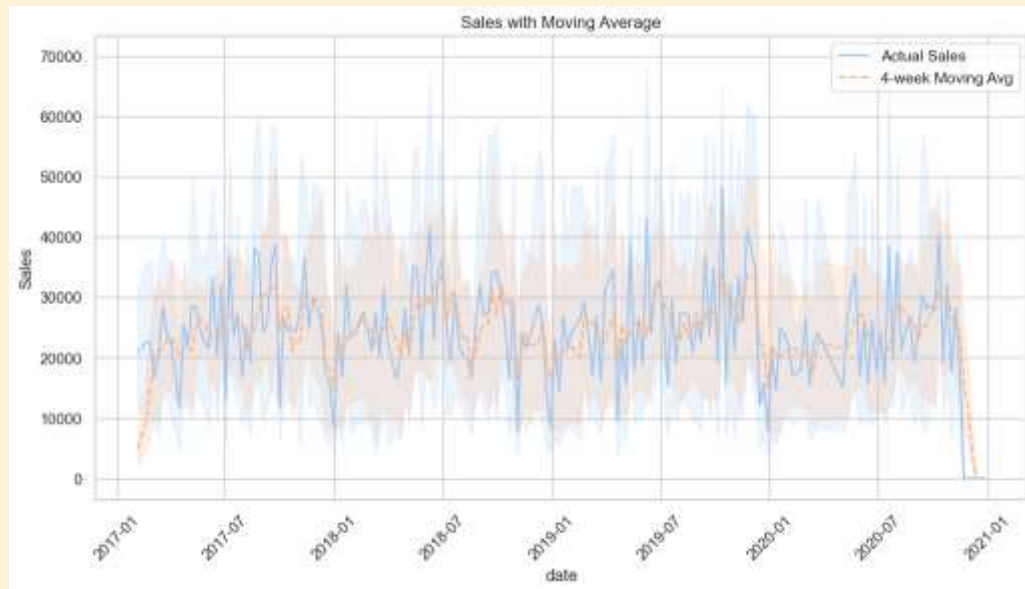
## CORRELATION BETWEEN FEATURES



- Sales are moderately correlated with price discounts and promotions
- Other factors such as mobility trends might have additional influence



## MOVING AVERAGE ANALYSIS



- Helps in smoothing out short-term fluctuations
- Useful for forecasting future sales trends

# **BUSINESS RECOMMENDATIONS**



## FUTURE INITIATIVES

1. **Optimize Discounts.** Test different discounting strategies for maximum effectiveness.
2. **Leverage Promotions.** Invest in high-impact promotions based on past trends.
3. **Seasonal Planning.** Adjust inventory and marketing strategies for high-sales periods.
4. **Improve Forecasting.** Use predictive modeling for better demand estimation.



# TECHNICAL RECOMMENDATIONS





## MODELING TECHNIQUES

### 1. Time-Series Forecasting.

- ARIMA: Short-term sales forecasting.
- Prophet: Trend and seasonality prediction.
- LSTM/BiLSTM: Advanced deep-learning models for time-series forecasting.

### 2. Regression Models.

- Random Forest Regressor: For complex feature interactions.
- XGBoost: High-accuracy predictive modeling.

### 3. Clustering Techniques.

- K-Means Clustering: Identifying product/customer segments based on sales pattern.

# THANK YOU

MAHNOOR FARHAT