

Product Sales Analysis

Introduction

Project Overview: The Sales Analysis Project is designed to help businesses harness the power of data to make informed decisions. By analysing sales data, we aim to extract actionable insights that will empower organizations to optimize inventory management and enhance marketing strategies. This project holds immense significance in today's competitive market, where data-driven decision-making is a key driver of success.

Insights from IBM Cognos Visualizations:

Top-Selling Products:

Our visualizations reveal that Product P2 consistently demonstrates the highest total unit sales and revenue over the years. This suggests that P2 is a top-selling product in our portfolio.

Sales Trends:

An examination of sales trends indicates a positive trend where sales of all products tend to increase from year to year. This upward trajectory could be attributed to factors like business growth and favorable market trends.

Customer Preferences:

The visualizations pinpoint interesting patterns, notably, that certain products, such as P3, exhibit distinct peaks in sales during specific months. This observation might indicate a clear customer preference for P3 during these months, possibly owing to seasonality or effective promotional strategies.

Optimizing Inventory Management:

The data analytics also highlights periods of peak sales, which can be invaluable for optimizing our inventory management. Being able to forecast and plan for these high-demand periods ensures we can meet customer needs efficiently.

Enhancing Marketing Strategies:

Leveraging the insights gained from customer preferences and sales trends, we are better equipped to inform our marketing strategies. For instance, if we observe that sales of P4 consistently decline during the summer months, this insight prompts us to adjust our marketing efforts to align with this seasonal fluctuation.

These insights are valuable for data-driven decision-making and can be leveraged to enhance our business strategies and maximize our competitive advantage.

Source Code:

```
import pandas as pd # library used for data manipulation and analysis
import numpy as np  # library used for working with arrays
import matplotlib.pyplot as plt # library for plots and visualizations
import seaborn as sns # library for visualizations
```

```
%matplotlib inline
```

```
import warnings
warnings.filterwarnings("ignore")
data = pd.read_csv('/content/statsfinal.csv')
data.head(-1)
data = data.drop(columns=['Unnamed: 0'])
data.info()
data.isnull().sum()
data['Day'] = data['Date'].apply(lambda x: x.split('-')[0])
data['Month'] = data['Date'].apply(lambda x: x.split('-')[1])
data['Year'] = data['Date'].apply(lambda x: x.split('-')[2])
data
data_reduced = data.query("Year != '2010' and Year != '2023'")
def plot_bar_chart(df, columns, stri, str1, val):
    # Aggregate sales for each product by year, by sum or mean
    if val == 'sum':
        sales_by_year = df.groupby('Year')[columns].sum().reset_index()
    elif val == 'mean':
        sales_by_year = df.groupby('Year')[columns].mean().reset_index()

    # Melt the data to make it easier to plot
    sales_by_year_melted = pd.melt(sales_by_year, id_vars='Year', value_vars=columns,
var_name='Product', value_name='Sales')

    # Create a bar chart
    plt.figure(figsize=(20,4))
    sns.barplot(data=sales_by_year_melted, x='Year', y='Sales', hue='Product') #,palette="cividis")
    plt.xlabel('Year')
    plt.ylabel(stri)
    plt.title(f'{stri} by {str1}')
    plt.xticks(rotation=45)
    plt.show()
plot_bar_chart(data_reduced, ['Q-P1', 'Q-P2', 'Q-P3', 'Q-P4'], 'Total Unit Sales', 'Year', 'sum')

plot_bar_chart(data_reduced, ['Q-P1', 'Q-P2', 'Q-P3', 'Q-P4'], 'Mean Unit Sales', 'Year', 'mean')
plot_bar_chart(data_reduced, ['S-P1', 'S-P2', 'S-P3', 'S-P4'], 'Total Revenue', 'Year', 'sum')

plot_bar_chart(data_reduced, ['S-P1', 'S-P2', 'S-P3', 'S-P4'], 'Mean Revenue', 'Year', 'mean')
def month_plot():
    fig, ax = plt.subplots()

    # Plot the sales data for each product by month
    data_reduced.groupby('Month')[['Q-P1', 'Q-P2', 'Q-P3', 'Q-P4']].sum().plot(ax=ax)

    # Set the x-axis limits to only show up to December
    ax.set_xlim(left=0, right=13)
```

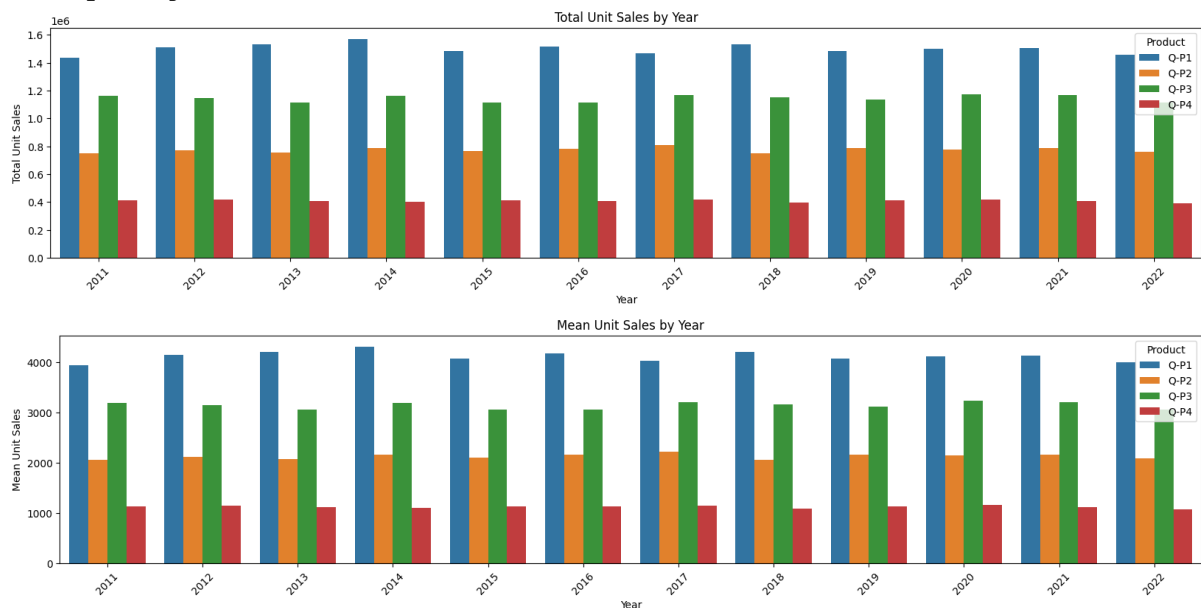
```
# Set the axis labels and title
ax.set_xlabel('Month')
ax.set_ylabel('Total unit sales')
ax.set_title('Trend in sales of all four products by month')
```

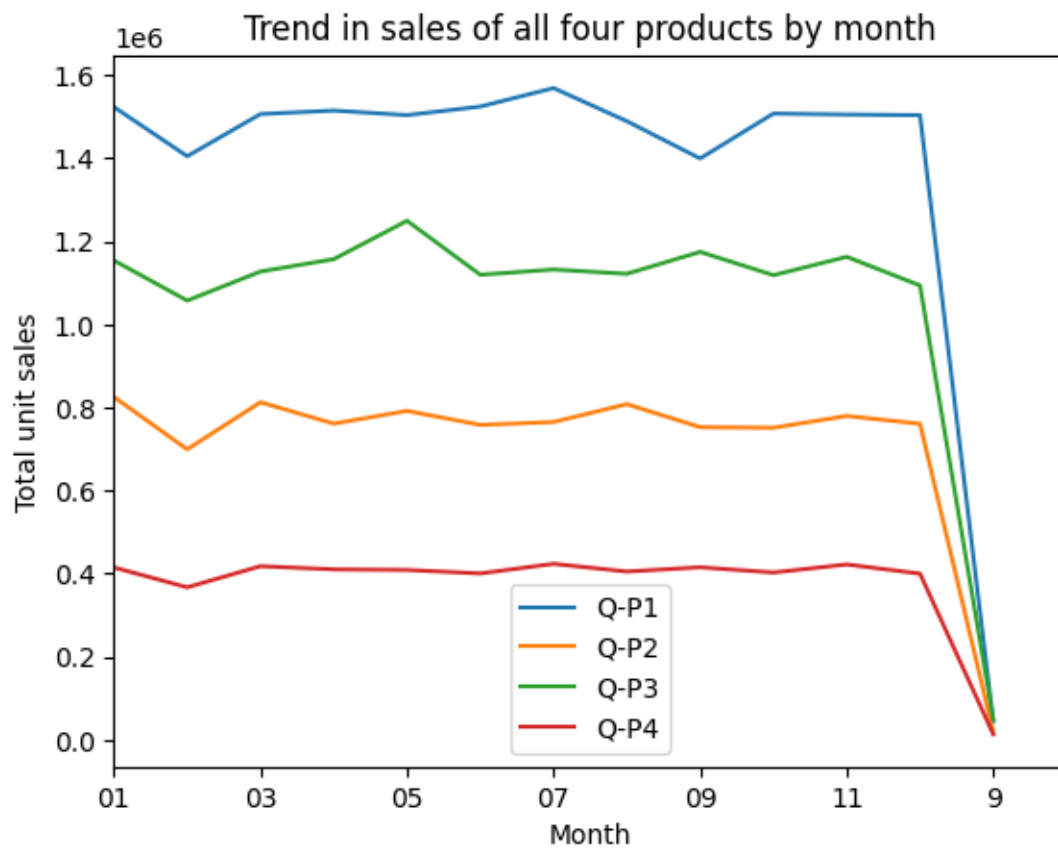
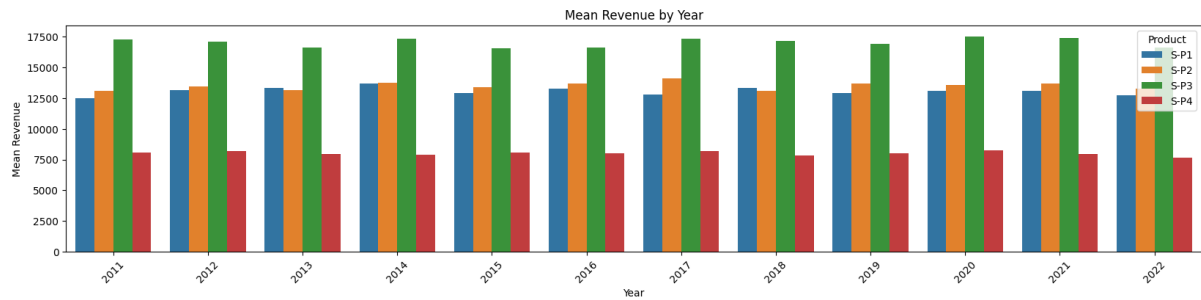
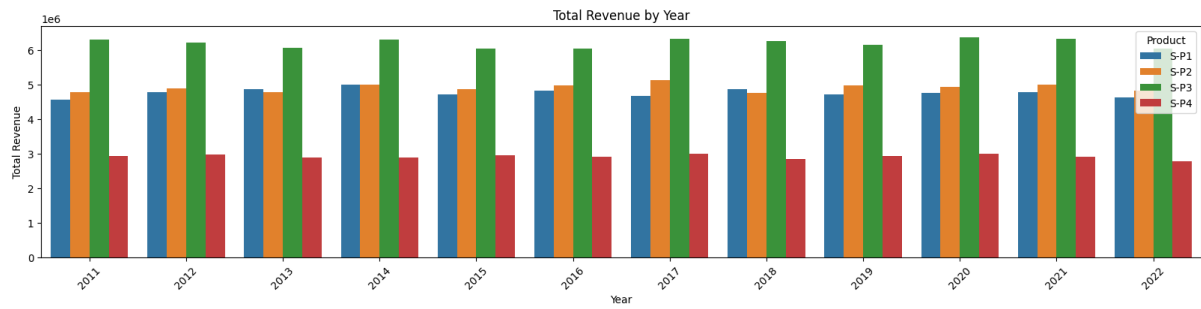
```
# Show the plot
plt.show()
```

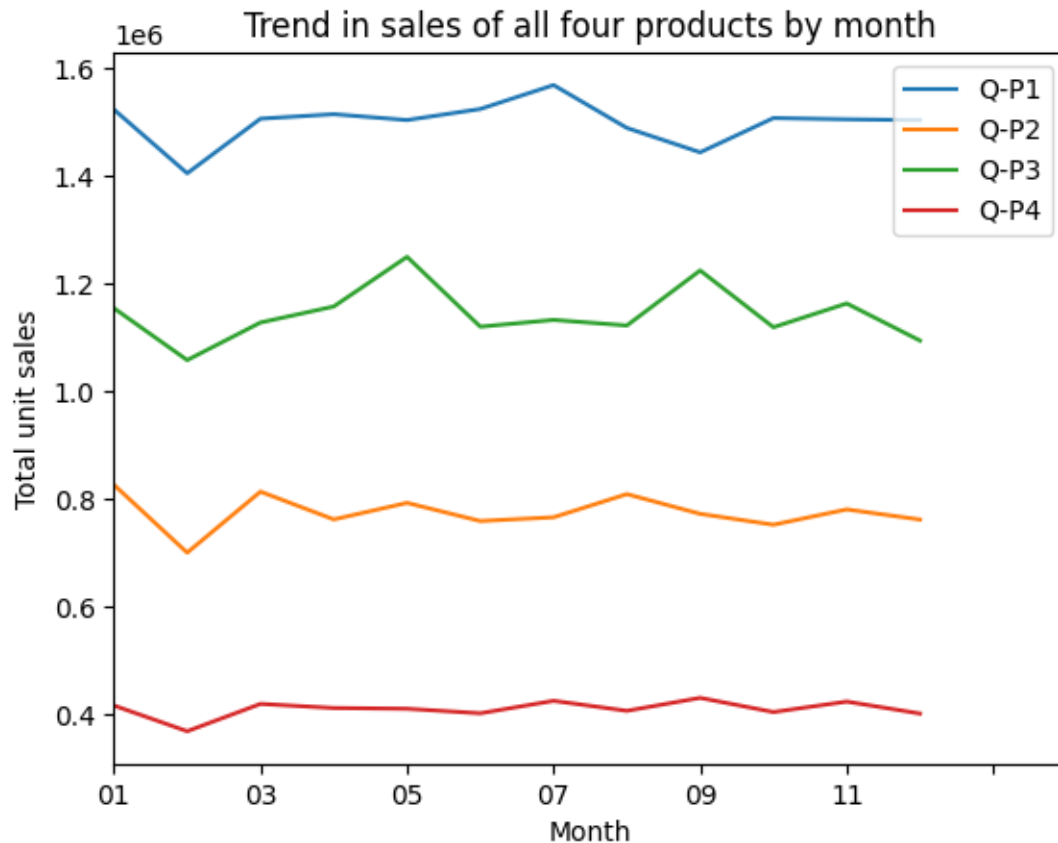
```
month_plot()
data_reduced['Month'] = data['Month'].replace('9', '09')
month_plot()
```

Outputs:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4599 entries, 0 to 4598
Data columns (total 9 columns):
 #   Column  Non-Null Count  Dtype
---  -
 0   Date    4599 non-null    object
 1   Q-P1    4599 non-null    int64
 2   Q-P2    4599 non-null    int64
 3   Q-P3    4599 non-null    int64
 4   Q-P4    4599 non-null    int64
 5   S-P1    4599 non-null    float64
 6   S-P2    4599 non-null    float64
 7   S-P3    4599 non-null    float64
 8   S-P4    4599 non-null    float64
dtypes: float64(4), int64(4), object(1)
memory usage: 323.5+ KB
```







Conclusion

Project Achievements: The Sales Analysis Project aims to provide valuable insights to optimize inventory management and marketing strategies. By adhering to design thinking principles and involving stakeholders, we aim to deliver a user-centered, data-driven solution that meets the project's objectives and adds significant value to the organization.

This comprehensive project plan ensures that each phase is well-defined and organized, with a clear focus on addressing the project's objectives through a user-centric approach and iterative design. It emphasizes the importance of ongoing monitoring and knowledge sharing to ensure the project's long-term success.