E-Commerce Sales Analysis Report

Analysis Overview

Monthly Sales Analysis
Identified the highest and lowest sales months.

Sales by Product Categories
Determined which category has the highest sales.

Sales by Subcategories
Breakdown of sales by subcategory.

Monthly Profit Analysis
Identified the most and least profitable months.

Profit by Category and Subcategory
Profit trends across categories and subcategories.

Sales & Profit by Customer Segment
Analysis of customer segments' contribution to sales and profit.

Sales-to-Profit Ratio
Evaluating profitability in relation to sales.

Python Code Used for Analysis

```
import pandas as pd



import plotly
print(plotly.__version__)

!pip install pandas plotly

!pip install --upgrade pip

import sys
!{sys.executable} -m pip install --upgrade pip


print("Pandas version:", pd.__version__)



import plotly.express as px #data cleaning
import plotly.graph_objects as go # data visualization
import plotly.io as pio #advanced customized graph
import plotly.colors as colors  # graph template cuatomized
pio.templates.default = "plotly_white"

data = pd.read_csv(r'C:\Users\Chandan\Desktop\jn\Sample - Superstore.csv' ,encoding ='unicode_escape')

data.describe()

pd.isnull(data).sum()

data['Order Date'] = pd.to_datetime(data['Order Date'])
data['Ship Date'] = pd.to_datetime(data['Ship Date'])
```

```
data.info()

data['Order Month'] = data['Order Date'].dt.month
data['Order Year'] = data['Order Date'].dt.year
data['Order day of week'] = data['Order Date'].dt.dayofweek

data.head()

sales_by_month = data.groupby('Order Month')['Sales'].sum().reset_index()

fig = px.line(sales_by_month,
              x='Order Month' ,
              y='Sales',
              title='monthly sales analysis')
fig.show()

sales_by_category = data.groupby('Category')['Sales'].sum().reset_index()

sales_by_category

fig = px.pie(sales_by_category,
              values='Sales',
              names='Category',
              hole=0.5,
              color_discrete_sequence=px.colors.qualitative.Pastel)
fig.update_traces(textposition='inside', textinfo='percent+label')
fig.update_layout(title_text='sales analysssis by category', title_font=dict(size=24))

fig.show()



sales_by_subcategory = data.groupby('Sub-Category')['Sales'].sum().reset_index()
sales_by_subcategory

fig = px.bar(sales_by_subcategory , x = 'Sub-Category' , y = 'Sales' , title = "sales by subcategory")
fig.show()

profit_by_month =  data.groupby('Order Month')['Profit'].sum().reset_index()

profit_by_month

fig = px.line(profit_by_month , x = 'Order Month' , y = 'Profit' , title = "profit analysis by month")
fig.show()

profit_by_category =  data.groupby('Category')['Profit'].sum().reset_index()
profit_by_category

sales_profit_by_segment = data.groupby('Segment').agg({'Sales':'Profit':'sum'}).reset_index()

sales_profit_by_segment = data.groupby('Segment').agg({'Sales':'sum','Profit':'sum'}).reset_index()
sales_profit_by_segment['sales_to_profit_ratio']=                              sales_profit_by_segment['Sales']/
sales_profit_by_segment['Profit']
print(sales_profit_by_segment[['Segment','sales_to_profit_ratio']])



Results:
6.0.0

Requirement                  already                  satisfied:                  pandas                  in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (2.2.3)
Requirement                  already                  satisfied:                  plotly                  in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (6.0.0)
Requirement                already                satisfied:                numpy>=1.26.0                in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from pandas) (2.2.3)
Requirement              already              satisfied:              python-dateutil>=2.8.2              in
```

```
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from pandas) (2.9.0.post0)
Requirement                 already                 satisfied:                 pytz>=2020.1                 in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from pandas) (2025.1)
Requirement                already                satisfied:                tzdata>=2022.7                in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from pandas) (2025.1)
Requirement               already               satisfied:                narwhals>=1.15.1               in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from plotly) (1.26.0)
Requirement                 already                 satisfied:                 packaging                 in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (from plotly) (24.2)
Requirement                 already                 satisfied:                 six>=1.5                 in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages                              (from
python-dateutil>=2.8.2->pandas) (1.17.0)


[notice] A new release of pip is available: 24.3.1 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

Requirement                  already                  satisfied:                  pip                  in
c:\users\chandan\appdata\local\programs\python\python313\lib\site-packages (24.3.1)

[notice] A new release of pip is available: 24.3.1 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip
ERROR: To modify pip, please run the following command:
C:\Users\Chandan\AppData\Local\Programs\Python\Python313\python.exe -m pip install --upgrade pip


Collecting pip
  Using cached pip-25.0.1-py3-none-any.whl.metadata (3.7 kB)
Using cached pip-25.0.1-py3-none-any.whl (1.8 MB)

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Using cached pip-25.0.1-py3-none-any.whl (1.8 MB)
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 24.3.1
    Uninstalling pip-24.3.1:
      Successfully uninstalled pip-24.3.1
Successfully installed pip-25.0.1

Pandas version: 2.2.3

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9994 entries, 0 to 9993
Data columns (total 21 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Row ID         9994 non-null   int64
 1   Order ID       9994 non-null   object
 2   Order Date     9994 non-null   datetime64[ns]
 3   Ship Date      9994 non-null   datetime64[ns]
 4   Ship Mode      9994 non-null   object
 5   Customer ID    9994 non-null   object
 6   Customer Name  9994 non-null   object
 7   Segment        9994 non-null   object
 8   Country        9994 non-null   object
 9   City           9994 non-null   object
 10  State          9994 non-null   object
 11  Postal Code    9994 non-null   int64
 12  Region         9994 non-null   object
 13  Product ID     9994 non-null   object
 14  Category       9994 non-null   object
 15  Sub-Category   9994 non-null   object
 16  Product Name   9994 non-null   object
 17  Sales          9994 non-null   float64
```

```
 18  Quantity       9994 non-null   int64
 19  Discount       9994 non-null   float64
 20  Profit         9994 non-null   float64
dtypes: datetime64[ns](2), float64(3), int64(3), object(13)
memory usage: 1.6+ MB
```

	Segment	sales_to_profit_ratio
0	Consumer	8.659471
1	Corporate	7.677245
2	Home Office	7.125416