EXPT NO: 8	**MINI PROJECT – Comprehensive E-Commerce Sales Dashboards: Real-Time Insights and Data-Driven Growth**

AIM

To design and develop an interactive e-commerce sales dashboard that provides real-time insights into sales performance, customer trends, and revenue growth using data visualization and analytics techniques.

ALGORITHM

1. **Start**
2. **Import Dataset:** Load the e-commerce sales dataset (CSV or Excel file).
3. **Data Cleaning:**
   Remove missing and duplicate records.
   Convert date and numeric fields into proper formats.
4. **Data Preprocessing:**
   Calculate total sales = Quantity × Price.
   Group data by category, region, and time.
5. **Visualization:**
   Create bar charts for category-wise sales.
   Use line graphs for sales over time.
   Use pie charts for regional or product share.
   Add KPI cards for total revenue, profit, and orders.
6. **Dashboard Design:**
   Combine all visualizations in one dashboard using Power BI / Tableau / Python.
   Enable filters for category, region, and date.
7. **Generate Insights:**
   Identify top-selling products.
   Observe seasonal sales trends.
8. **Display Final Dashboard** showing real-time updates and insights.
9. **Stop**

CODING

```
# dashboard.py
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import streamlit as st
import plotly.express as px

# Page config
st.set_page_config(page_title="E-commerce Sales Dashboard", layout="wide")
st.title("🛒 E-commerce Sales Dashboard (Interactive & Real-time)")
```

```
# --------------------- Load Data ---------------------
df = pd.read_csv("sales.csv")

df["Sales"] = pd.to_numeric(df["Sales"], errors="coerce")
df["Profit"] = pd.to_numeric(df.get("Profit", 0), errors="coerce")
df["Order Date"] = pd.to_datetime(df["Order Date"], errors="coerce")
df["Month"] = df["Order Date"].dt.to_period("M").astype(str)
df["Year"] = df["Order Date"].dt.year
df["Day"] = df["Order Date"].dt.day

# --------------------- Widgets for Interactivity ---------------------
st.sidebar.header("꽝 Filters (Real-time)")
category_filter = st.sidebar.multiselect("Select Category", df["Category"].unique(),
default=df["Category"].unique())
product_filter = st.sidebar.text_input("Search Product (Type any name)", "")
date_range = st.sidebar.date_input("Select Date Range", [df["Order Date"].min(), df["Order
Date"].max()])
top_n_products = st.sidebar.number_input("Top N Products", min_value=1, max_value=20,
value=10)
profit_target = st.sidebar.slider("Profit Margin Target", 0, 100, 20)

# Apply filters
filtered_df = df[df["Category"].isin(category_filter)]
if product_filter:
    filtered_df = filtered_df[filtered_df["Product Name"].str.contains(product_filter,
case=False)]
filtered_df = filtered_df[(filtered_df["Order Date"] >= pd.to_datetime(date_range[0])) &
                          (filtered_df["Order Date"] <= pd.to_datetime(date_range[1]))]

# --------------------- Feature 1: Total Sales ---------------------
st.subheader("🟦 Total Sales")
st.metric("괭 Total Sales", f"${filtered_df['Sales'].sum():,.2f}")

# ------------------- Feature 2: Monthly Sales Trend -------------------
st.subheader("🟦 Monthly Sales Trend")
monthly_sales = filtered_df.groupby("Month")["Sales"].sum().reset_index()
fig, ax = plt.subplots(figsize=(10,5))
sns.lineplot(x="Month", y="Sales", data=monthly_sales, marker="o", ax=ax)
plt.xticks(rotation=45)
st.pyplot(fig)

# ------------------- Feature 3: Daily Sales Trend -------------------
st.subheader("🟦 Daily Sales Trend")
daily_sales = filtered_df.groupby("Order Date")["Sales"].sum().reset_index()
fig = px.line(daily_sales, x="Order Date", y="Sales", title="Daily Sales")
st.plotly_chart(fig, use_container_width=True)
```

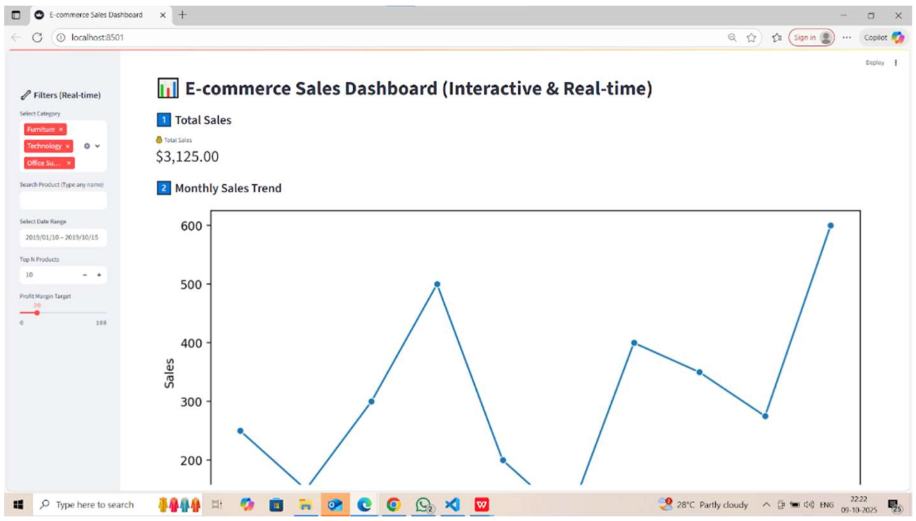
```
# ------------------- Feature 4: Sales by Category -------------------
st.subheader(" Sales by Category")
category_sales = filtered_df.groupby("Category")["Sales"].sum().reset_index()
fig = px.bar(category_sales, x="Category", y="Sales", title="Category-wise Sales",
text_auto=True)
st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 5: Sub-category Sales -------------------
st.subheader(" Sales by Sub-Category")
sub_sales = filtered_df.groupby("Sub-
Category")["Sales"].sum().reset_index().sort_values("Sales", ascending=False)
fig = px.bar(sub_sales, x="Sub-Category", y="Sales", title="Sub-Category-wise Sales")
st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 6: Region-wise Sales -------------------
st.subheader(" Sales by Region")
region_sales = filtered_df.groupby("Region")["Sales"].sum().reset_index()
fig = px.pie(region_sales, names="Region", values="Sales", title="Sales by Region")
st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 7: Sales by Country -------------------
if "Country" in filtered_df.columns:
   st.subheader(" Sales by Country")
   fig = px.choropleth(filtered_df, locations="Country", locationmode="country names",
                    color="Sales", title="Sales by Country")
   st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 8: Top N Products -------------------
st.subheader(" Top Selling Products")
top_products = filtered_df.groupby("Product
Name")["Sales"].sum().nlargest(top_n_products).reset_index()
fig = px.bar(top_products, x="Sales", y="Product Name", orientation="h", title=f"Top
{top_n_products} Products")
st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 9: Customer Segment Sales -------------------
if "Segment" in filtered_df.columns:
   st.subheader(" Sales by Customer Segment")
   segment_sales = filtered_df.groupby("Segment")["Sales"].sum().reset_index()
   fig = px.pie(segment_sales, names="Segment", values="Sales", title="Segment-wise
Sales")
   st.plotly_chart(fig, use_container_width=True)

# --------------------- Feature 10: Yearly Sales ---------------------
st.subheader(" Yearly Sales")
yearly_sales = filtered_df.groupby("Year")["Sales"].sum().reset_index()
```

```
fig = px.bar(yearly_sales, x="Year", y="Sales", title="Yearly Sales")
st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 11: Profit by Category -------------------
if "Profit" in filtered_df.columns:
    st.subheader(" Profit by Category")
    profit_category = filtered_df.groupby("Category")["Profit"].sum().reset_index()
    fig = px.bar(profit_category, x="Category", y="Profit", title="Profit by Category")
    st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 12: Profit vs Sales Scatterplot -------------------
if "Profit" in filtered_df.columns:
    st.subheader(" Profit vs Sales")
    fig = px.scatter(filtered_df, x="Sales", y="Profit", color="Category", size="Sales",
title="Profit vs Sales")
    st.plotly_chart(fig,  use_container_width=True)

# ------------------- Feature 13: Average Order Value -------------------
st.subheader(" Average Order Value")
avg_order = filtered_df.groupby("Order ID")["Sales"].sum().mean()
st.metric(" Avg Order Value", f"${avg_order:,.2f}")

# ------------------- Feature 14: Sales Heatmap -------------------
st.subheader(" Sales Heatmap (Day vs Month)")
heatmap_data = filtered_df.pivot_table(index="Day", columns="Month", values="Sales",
aggfunc="sum")
fig, ax = plt.subplots(figsize=(12,6))
sns.heatmap(heatmap_data, cmap="Blues", ax=ax)
st.pyplot(fig)

# ------------------- Feature 15: Sales by Payment Mode -------------------
if "Payment Mode" in filtered_df.columns:
    st.subheader(" Sales by Payment Mode")
    payment_sales = filtered_df.groupby("Payment Mode")["Sales"].sum().reset_index()
    fig = px.pie(payment_sales, names="Payment Mode", values="Sales", title="Payment
Methods")
    st.plotly_chart(fig,  use_container_width=True)

# ------------------- Feature 16: State-wise Sales -------------------
if "State" in filtered_df.columns:
    st.subheader(" State-wise Sales")
    state_sales =
filtered_df.groupby("State")["Sales"].sum().reset_index().sort_values("Sales",
ascending=False).head(10)
    fig = px.bar(state_sales, x="State", y="Sales", title="Top 10 States by Sales")
    st.plotly_chart(fig, use_container_width=True)
```

```
# ------------------- Feature 17: Ship Mode Analysis -------------------
if "Ship Mode" in filtered_df.columns:
    st.subheader(" Sales by Shipping Mode")
    ship_sales = filtered_df.groupby("Ship Mode")["Sales"].sum().reset_index()
    fig = px.bar(ship_sales, x="Ship Mode", y="Sales", title="Sales by Ship Mode")
    st.plotly_chart(fig, use_container_width=True)

# --------------------- Feature 18: Profit Margin ---------------------
if "Profit" in filtered_df.columns:
    st.subheader(" Profit Margin")
    profit_margin = (filtered_df["Profit"].sum() / filtered_df["Sales"].sum()) * 100
    st.metric(" Profit Margin", f"{profit_margin:.2f}%")

# ------------------- Feature 19: Sales vs Discount -------------------
if "Discount" in filtered_df.columns:
    st.subheader(" Sales vs Discount")
    fig = px.scatter(filtered_df, x="Discount", y="Sales", color="Category", title="Sales vs
Discount")
    st.plotly_chart(fig, use_container_width=True)

# ------------------- Feature 20: Correlation Heatmap -------------------
st.subheader(" Correlation Heatmap")
corr = filtered_df.corr(numeric_only=True)
fig, ax = plt.subplots(figsize=(8,6))
sns.heatmap(corr, annot=True, cmap="coolwarm", ax=ax)
st.pyplot(fig)

# ------------------- Extra Feature 21: Product Filter -------------------
st.subheader(" Filtered Product Sales")
if product_filter:
    product_sales = filtered_df.groupby("Product Name")["Sales"].sum().reset_index()
    fig = px.bar(product_sales, x="Product Name", y="Sales", title=f"Sales for
'{product_filter}'")
    st.plotly_chart(fig, use_container_width=True)

# ------------------- Extra Feature 22: Date Range Sales -------------------
st.subheader(" Sales in Selected Date Range")
date_filtered_sales = filtered_df.groupby("Order Date")["Sales"].sum().reset_index()
fig = px.line(date_filtered_sales, x="Order Date", y="Sales", title="Sales Over Selected
Dates")
st.plotly_chart(fig, use_container_width=True)

# ------------------- Extra Feature 23: Segment Filter -------------------
if "Segment" in filtered_df.columns:
    st.subheader(" Segment Filter")
```

```
   segments  =  filtered_df.groupby("Segment")["Sales"].sum().reset_index()
   fig = px.bar(segments, x="Segment", y="Sales", title="Sales by Segment")
   st.plotly_chart(fig, use_container_width=True)

# ------------------- Extra Feature 24: Profit Target Highlight -------------------
st.subheader("   Products Below Profit Target")
low_profit_products = filtered_df[filtered_df["Profit"] < profit_target]
fig = px.bar(low_profit_products.groupby("Product Name")["Profit"].sum().reset_index(),
         x="Product Name", y="Profit", title=f"Products with Profit < {profit_target}")
st.plotly_chart(fig,  use_container_width=True)

# ------------------- Extra Feature 25: Top N Products (Interactive) -------------------
st.subheader("   Top N Products Selector")
# Already done above using top_n_products in sidebar
```

OUTPUT :



E-commerce Sales Dashboard

localhost:8501

Filters (Real-time)

Select Category: Furniture ×, Technology ×, Office Su... ×

Search Product (Type any name)

Select Date Range: 2019/01/10 – 2019/10/15

Top N Products: 10

Profit Margin Target: 20 (0 – 100)

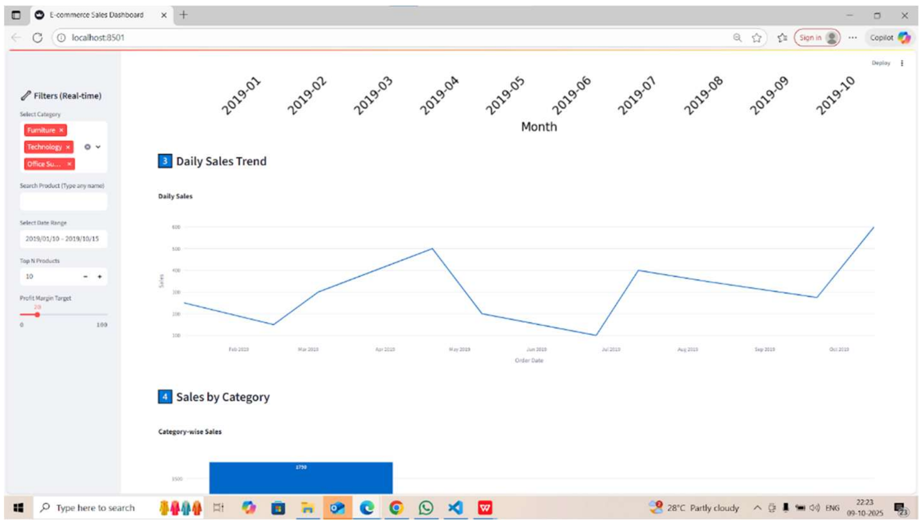
📊 E-commerce Sales Dashboard (Interactive & Real-time)

1 Total Sales

Total Sales

$3,125.00

2 Monthly Sales Trend



E-commerce Sales Dashboard

localhost:8501

Filters (Real-time)

Select Category: Furniture ×, Technology ×, Office Su... ×

Search Product (Type any name)

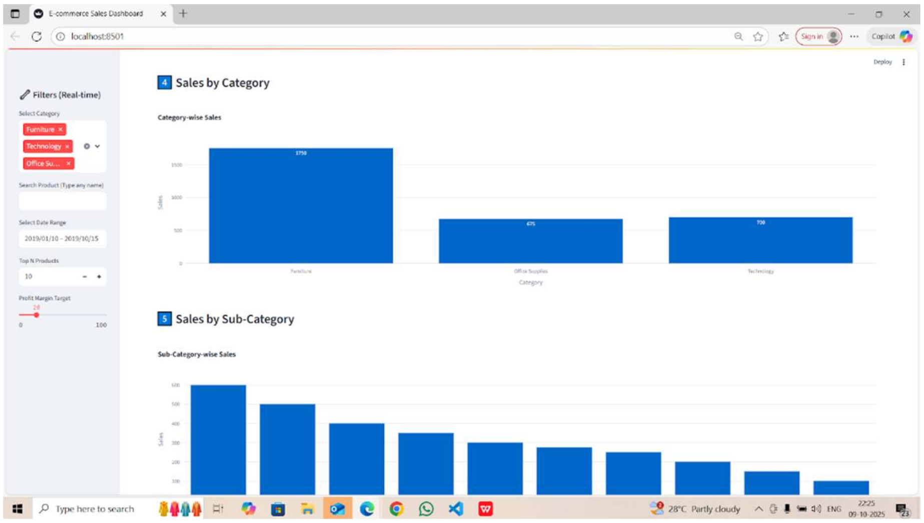
Select Date Range: 2019/01/10 – 2019/10/15

Top N Products: 10

Profit Margin Target: 20 (0 – 100)

3 Daily Sales Trend

4 Sales by Category



Filters (Real-time)

Select Category: Furniture ×, Technology ×, Office Su... ×

Search Product (Type any name)

Select Date Range: 2019/01/10 – 2019/10/15

Top N Products: 10

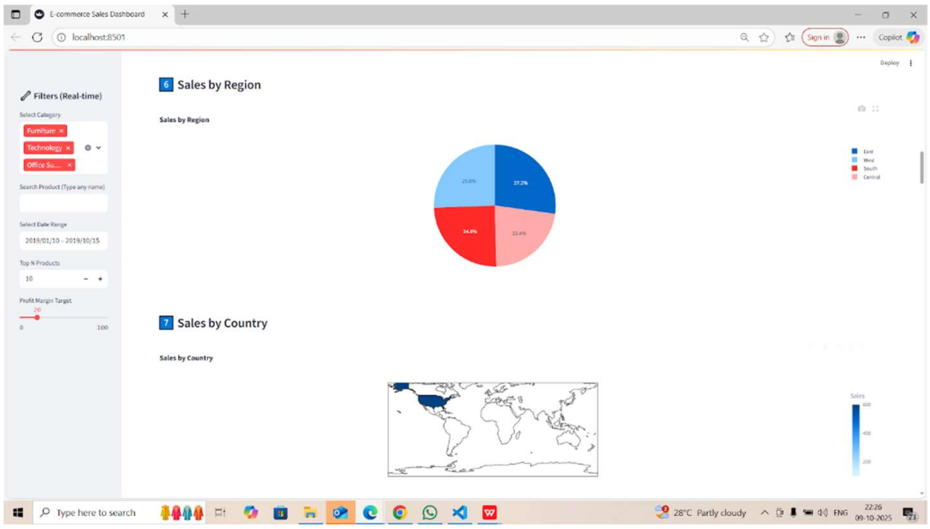
Profit Margin Target: 20 (0 – 100)

4 Sales by Category

Category-wise Sales

5 Sales by Sub-Category

Sub-Category-wise Sales



Filters (Real-time)

Select Category: Furniture ×, Technology ×, Office Su... ×

Search Product (Type any name)

Select Date Range: 2019/01/10 – 2019/10/15

Top N Products: 10

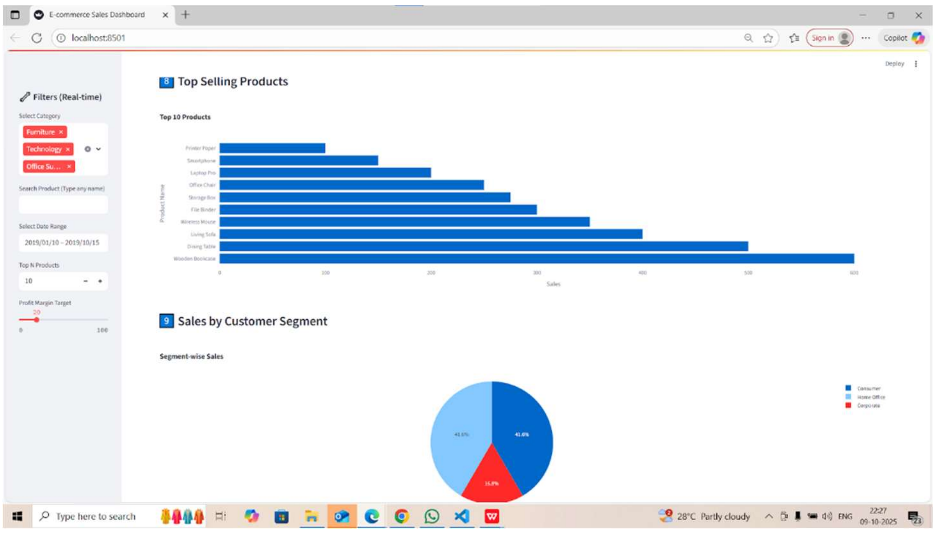
Profit Margin Target: 20 (0 – 100)

6 Sales by Region

Sales by Region

7 Sales by Country

Sales by Country



Filters (Real-time)

Select Category: Furniture ×, Technology ×, Office Su... ×

Search Product (Type any name)

Select Date Range: 2019/01/10 – 2019/10/15

Top N Products: 10

Profit Margin Target: 20 (0 – 100)

8 Top Selling Products

Top 10 Products

9 Sales by Customer Segment

Segment-wise Sales

RESULT:

The project successfully visualized the e-commerce sales data using real-time dashboards. The system helps in monitoring sales performance, identifying top-selling products, and supporting data-driven decisions for business growth.