Title: - Store Sales and Profit Analysis

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❖ Objective: -

The objective of store sales and profit analysis is to evaluate and understand the performance of a store or a group of stores in terms of revenue generation, profitability, and operational efficiency. This analysis provides actionable insights for making informed business decisions, optimizing resources, and maximizing profitability. Below are the primary objectives:

❖ Problem Statement: -

Store sales in a competitive retail environment, stores face challenges in understanding the factors that drive sales and profitability. Despite having access to large volumes of data, businesses often struggle to extract meaningful insights due to unorganized data, lack of efficient analysis techniques, and the inability to connect sales trends with profit outcomes. This can lead to inefficient resource allocation, poor inventory management, missed opportunities for growth, and suboptimal decision-making.

The problem lies in identifying key trends in sales performance, understanding profitability across products and stores, and uncovering actionable insights optimize operations and maximize profits. Without proper analysis, businesses risk overstocking low-demand products, understocking high-demand items, mismanaging operational costs, and failing to adapt to changing customer preferences.

❖ Solution: -

To address the challenges identified in the problem statement, the solution involves implementing a systematic and data-driven approach to analyse store sales and profitability. This approach will leverage modern data analysis tools and techniques to extract actionable insights, optimize operations, and support strategic decision-making.

Below are the key components of the solution:

1. Data Collection and Integration

- **Centralized Data Repository**: Collect and consolidate data from various sources such as sales systems, inventory databases, customer relationship management (CRM) systems, and marketing platforms.
- **Automated Data Pipeline**: Set up an automated pipeline to ensure real-time or periodic data updates for accurate analysis.
- **Data Cleaning and Preparation**: Address missing, duplicate, or inconsistent data to ensure the accuracy and reliability of insights.

2. Sales Performance Analysis

- **Trend Identification**: Analyse historical sales data to identify patterns and seasonal trends.
- **Product Performance**: Identify top-performing and underperforming products or categories.
- **Store Comparison**: Compare sales across different store locations to understand regional performance differences.

3. Profitability Analysis

- **Profit Margin Calculation**: Calculate profit margins for individual products, categories, and stores to identify high and low-margin items.
- **Cost Analysis**: Break down operational costs, such as rent, labour, and inventory, to evaluate their impact on profitability.
- **Revenue Drivers**: Analyse which factors contribute most to revenue generation and profitability (e.g., specific promotions or products).

4. Inventory Optimization

- **Demand Forecasting**: Use predictive analytics to forecast demand for different products, ensuring adequate stock levels for high-demand items while minimizing overstock.
- **Inventory Turnover Analysis**: Identify slow-moving inventory to avoid overstocking and reduce carrying costs.
- **Replenishment Strategy**: Optimize reorder cycles and supplier relationships to improve inventory management.

5. Customer Behaviour Insights

- **Customer Segmentation**: Segment customers based on purchasing patterns, frequency, and spending habits.
- **Retention Strategies**: Identify loyal customers and develop targeted retention strategies, such as personalized offers or loyalty programs.
- **Marketing ROI**: Analyse the effectiveness of marketing campaigns in driving customer engagement and sales.

6. Visualization and Reporting

- **Interactive Dashboards**: Create interactive dashboards using tools like Power BI, Tableau, or Excel for real-time visualization of sales and profit metrics.
- **Key Performance Indicators (KPIs)**: Track essential KPIs such as total sales, profit margins, inventory turnover, and customer acquisition cost.
- **Custom Reports**: Generate automated reports for stakeholders, summarizing insights and recommendations.

7. Actionable Recommendations

- **Pricing Strategies**: Develop pricing strategies based on sales performance and customer demand to optimize revenue and margins.
- **Promotion Planning**: Plan promotions and discounts for slow-moving products or seasonal campaigns to boost sales.
- **Resource Allocation**: Allocate resources effectively based on store performance and profitability analysis.

❖ Implementation: -

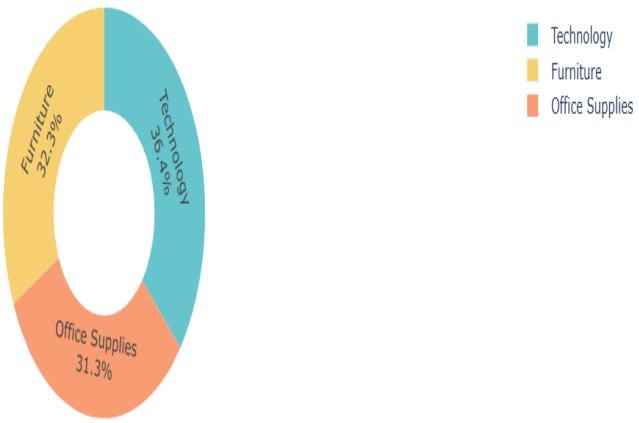
```
import pandas as pd
import plotly.express as px
import plotly.graph_objects as go
import plotly.io as pio
import plotly.colors as colors
pio.templates.default = "plotly_white"
data = pd. read_csv("Sample - Superstore.csv", encoding='latin-1')
print(data.head())
print(data.describe())
data['Order Date'] = pd.to_datetime(data['Order Date'])
data['Ship Date'] = pd.to_datetime(data['Ship Date'])

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
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()


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')
```

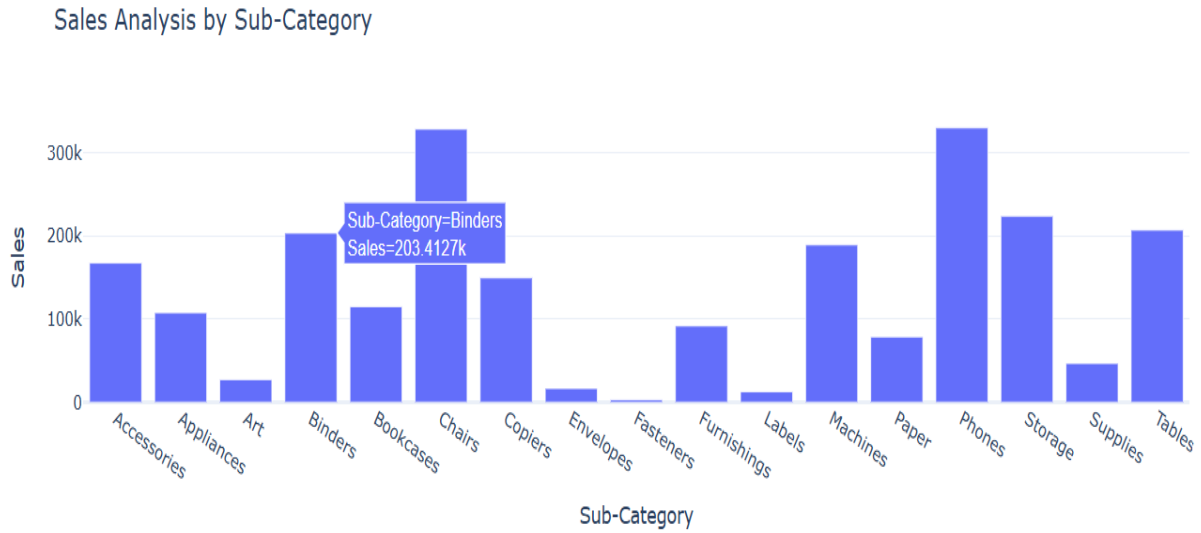
```
fig.update_layout(title_text='Sales Analysis by Category',
title_font=dict(size=24))

fig.show()
sales_by_subcategory = data.groupby('Sub-
Category')['Sales'].sum().reset_index()
fig = px.bar(sales_by_subcategory,
        x='Sub-Category',
        y='Sales',
        title='Sales Analysis by Sub-Category')
fig.show()
profit_by_month = data.groupby('Order
Month')['Profit'].sum().reset_index()
fig = px.line(profit_by_month,
         x='Order Month',
         y='Profit',
         title='Monthly Profit Analysis')
fig.show()
profit_by_category =
data.groupby('Category')['Profit'].sum().reset_index()

fig = px.pie(profit_by_category,
        values='Profit',
        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='Profit Analysis by Category',
title_font=dict(size=24))

fig.show()
profit_by_subcategory = data.groupby('Sub-
Category')['Profit'].sum().reset_index()
fig = px.bar(profit_by_subcategory, x='Sub-Category',
        y='Profit',
        title='Profit Analysis by Sub-Category')
```

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

color_palette = colors.qualitative.Pastel

fig = go.Figure()
fig.add_trace(go.Bar(x=sales_profit_by_segment['Segment'],
                y=sales_profit_by_segment['Sales'],
                name='Sales',
                marker_color=color_palette[0]))
fig.add_trace(go.Bar(x=sales_profit_by_segment['Segment'],
                y=sales_profit_by_segment['Profit'],
                name='Profit',
                marker_color=color_palette[1]))

fig.update_layout(title='Sales and Profit Analysis by Customer
Segment',
              xaxis_title='Customer Segment', yaxis_title='Amount')

fig.show()
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']
```

❖ Output: -

Sales Analysis by Category




Sales Analysis by Sub-Category
300k
200k
100k
0
Sales
Sub-Category=Binders
Sales=203.4127k
Accessories
Appliances
Art
Binders
Bookcases
Chairs
Copiers
Envelopes
Fasteners
Furnishings
Labels
Machines
Paper
Phones
Storage
Supplies
Tables
Sub-Category


Monthly Profit Analysis
40k
30k
20k
10k
Profit
2
4
6
8
10
12
Order Month

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