**Product Sales Analysis**

**Introduction**

Product sales analysis is an essential practice for businesses seeking to gain valuable insights into their sales performance, customer behavior, and market trends. This systematic examination of sales data encompasses various factors, including product sales volumes, revenue, customer demographics, and purchasing patterns. The primary objective of product sales analysis is to extract actionable information that informs strategic decisions, enhances operational efficiency, and drives business growth.In today's data-rich and technologically advanced business environment, product sales analysis has become indispensable. It enables businesses to understand customer preferences, optimize inventory management, identify sales trends, enhance pricing strategies, evaluate marketing campaigns, and identify cross-selling and up-selling opportunities. By segmenting customers and monitoring performance against key performance indicators, companies can make data-driven decisions, allocate resources efficiently, and remain competitive in dynamic markets. Leveraging advanced analytics tools and techniques, businesses can gain deeper insights into their sales data, make informed forecasts, and continually improve their sales strategies to meet evolving market demands.

**1. Objectives**

In Phase 4, we aim to achieve the following objectives:

1. **Data Exploration and Visualization:** Data exploration and visualization are fundamental steps in data analysis. Data exploration involves examining data for patterns, anomalies, and missing values. Data visualization converts data into graphical representations to highlight insights, trends, and relationships. These processes enhance data understanding, guide modeling choices, and facilitate effective communication of findings, supporting informed decision-making.
2. **Dashboard Design:** Using IBM Cognos, we will design interactive dashboards that condense complex data into easily digestible formats. These dashboards will serve as a valuable resource for stakeholders and decision-makers to monitor and assess performance.
3. **Data Preparation and Pre-processing:** Data preparation and preprocessing are critical steps in the data analysis pipeline. Data preparation involves collecting, cleaning, and organizing raw data from various sources to ensure it is ready for analysis. This may include handling missing values, dealing with outliers, and structuring data for analysis. Data preprocessing encompasses tasks like feature engineering, scaling, and encoding to make the data suitable for machine learning algorithms. These steps are essential for generating accurate, reliable insights and models from the data.

**2.1 Data Sources**

Data sources refer to the origins of data used for analysis, research, or decision-making. These sources can be diverse and include databases, surveys, sensors, social media, web scraping, and more. Data sources provide the foundational information that organizations and individuals rely on to gain insights, make informed choices, and conduct research. Accessing, managing, and analyzing data from these sources is a fundamental aspect of data-driven activities.

**2.2 Data Cleaning**

Data cleaning is the process of identifying and rectifying errors, inconsistencies, and inaccuracies in a dataset. It involves tasks like handling missing values, correcting data format issues, and addressing outliers. The objective is to ensure that the data is accurate and reliable for analysis, preventing erroneous results and insights. Data cleaning is a crucial step in the data preparation process, facilitating more effective and accurate data analysis and modeling.

**2.3 Data Structuring**

Data structuring involves organizing data into a logical and manageable format. It often consists of arranging data into rows and columns, where rows represent individual data points, and columns represent attributes or features of those points. This structured format makes data more accessible and facilitates various data analysis and modeling techniques, making it easier to derive insights and patterns from the data.

**2.4 Data Documentation**

Throughout the data preparation and preprocessing phase, we maintained comprehensive documentation. This documentation provides transparency and traceability, ensuring that the processes applied to the dataset are well-documented and reproducible.

The result of our data preparation and preprocessing efforts is a structured, clean, and reliable dataset ready for in-depth exploration, visualization, and regression analysis. This robust dataset will underpin our subsequent analyses, providing a solid foundation for meaningful insights and predictions.

**CODING :**

import matplotlib.pyplot as plt

# Data

labels = 'A', 'B', 'C', 'D'

sizes = [15, 30, 45, 10]

explode = (0, 0.1, 0, 0) # To explode a slice

# Create a pie chart

plt.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%', shadow=True, startangle=140)

# Title

plt.title("Sample Pie Chart")

# Show the chart

plt.show()

import matplotlib.pyplot as plt

# Data

categories = ['Category A', 'Category B', 'Category C', 'Category D']

values = [20, 35, 30, 25]

# Create a bar graph

plt.bar(categories, values)

# Title and labels

plt.title("Sample Bar Graph")

plt.xlabel("Categories")

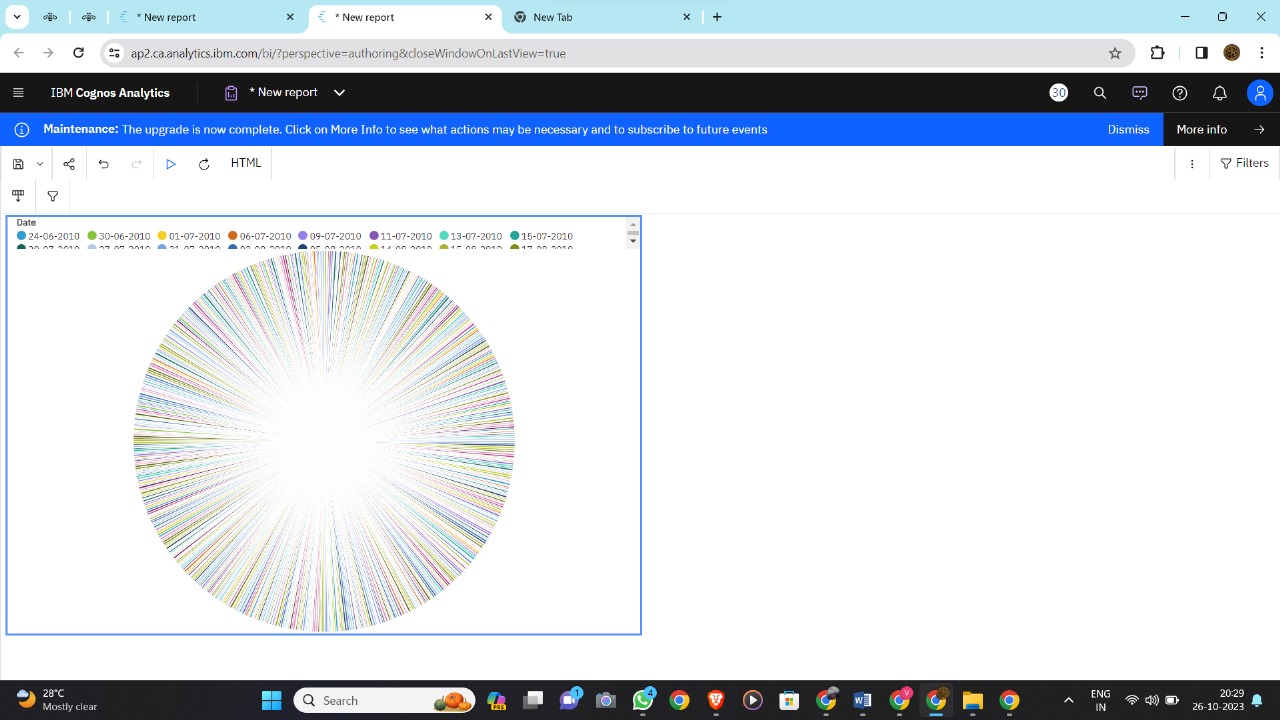
plt.ylabel("Values")

# Show the graph

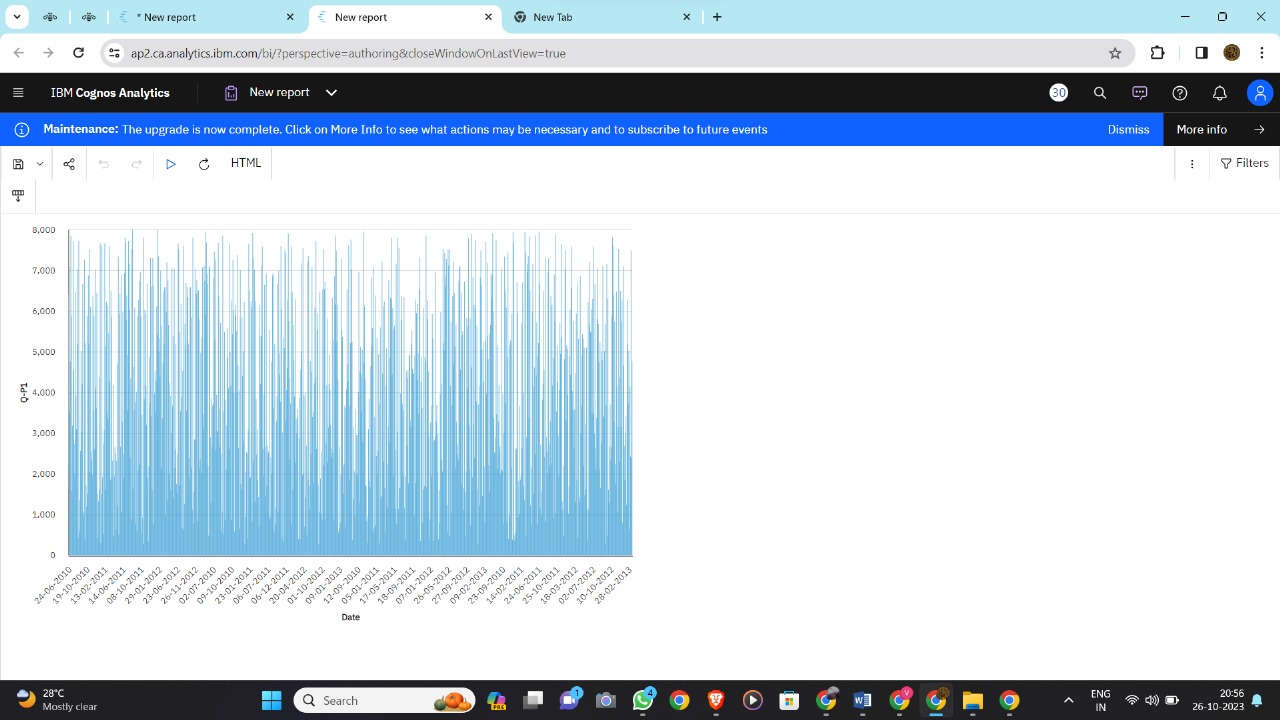
plt.show()

**OUTPUT**

**IBM Cognos**

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peak sales period



customer preference