BUSINESS INTELLIGENCE

LAB RECORD

BY

Name of the Student:

_____

Bearing Hall-Ticket No:

1	4	0	1	2			6	7	2			

Submitted as part of the MBA program for the course MB 403 Business Intelligence in MBA IV-Semester for the Academic Year 2023-2024

AL-QURMOSHI Institute Of Business Management

(Approved by AICTE & Affiliated to OSMANIA UNIVERSITY)

HYDERABAD - 500005

AQIBM HYDERABAD AL-QURMOSHI INSTITUTE OF BUSINESS MANAGEMENT

Approved by : AICTE, Ministry of HRD Govt. of India, Affiliated to Osmania University

Date: 12-06-2024

CERTIFICATE

This is to certify that Mr./Ms. _____ bearing HALL-TICKET NO: 1401-____-672-_____ studying MBA IV-Semester for the academic year 2023-24 has completed Business Intelligence Lab work as part of the MBA program for the course MB 403 Business Intelligence in MBA IV-Semester for the Academic Year 2023-2024.

Signature of the Internal Examiner

Signature of the External examiner **Principal**

MASTER OF BUSINESS ADMINISTRATION (MBA) SEMESTER-IV

Business Intelligence Lab Syllabus

The Business Intelligence lab will cover the following syllabus:

- Introduction to Business Intelligence tools: Tableau and Power BI
- Creating interactive dashboards and reports
- Data storytelling and communicating insights effectively
- Developing a comprehensive BA solution for a real-world business problem.

Suggested Readings:

1. Ramesh Sharda, Dursur Delen, " Business Intelligence and Analytics" Pearson Education

2. Prasad R.N., Seema Acharya, " Fundamentals of Business Analytics" Wiley

3. Albright, Winston, " Business Analytics – Data Analytics and Decision Making" Cengage Learning

Overview:

1. Introduction to Business Intelligence Tools: Tableau and Power BI

1.1 Overview of Business Intelligence (BI)

Business Intelligence (BI) refers to technologies, applications, and practices for the collection, integration, analysis, and presentation of business information. The goal of BI is to support better business decision-making.

1.2 Introduction to Tableau

Tableau is a leading BI tool that helps in visualizing and understanding data. It allows users to create a wide range of interactive and shareable dashboards, depicting trends, variations, and density of data points through graphs and charts.

Key Features:

- Drag-and-drop interface
- Extensive visualization options
- Real-time data analysis
- Integration with various data sources

1.3 Introduction to Power BI

Power BI is a business analytics tool by Microsoft that provides interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create their own reports and dashboards.

Key Features:

- Data connectivity and preparation
- Data visualization and exploration
- Real-time analytics
- Seamless integration with Microsoft products

2. Creating Interactive Dashboards and Reports

2.1 Steps in Tableau

1. Connecting to Data: Connect Tableau to various data sources (Excel, SQL Server, etc.).
2. Creating Visualizations: Use the drag-and-drop interface to create different types of charts.
3. Building Dashboards: Combine multiple visualizations into a single interactive dashboard.
4. Sharing Reports: Publish the dashboard to Tableau Server or Tableau Public.

2.2 Steps in Power BI

1. Connecting to Data: Import data from various sources like Excel, databases, etc.
2. Creating Visualizations: Use the wide range of visualization options available.
3. Building Dashboards: Create dashboards to bring together various visual reports.
4. Sharing Reports: Share the dashboards via Power BI service.

Example: Creating a Sales Dashboard In Tableau:

1. Connect to Data: Import sales data from an Excel file.
2. Create Charts: Generate bar charts for sales by region, line charts for sales trends over time.
3. Build Dashboard: Combine charts to show overall sales performance.
4. Publish: Share the dashboard through Tableau Public.

In Power BI:

1. Connect to Data: Load sales data into Power BI.
2. Create Charts: Use Power BI to create similar visualizations.
3. Build Dashboard: Integrate all visualizations into a comprehensive dashboard.
4. Share: Publish the dashboard to Power BI service.

3. Data Storytelling and Communicating Insights Effectively

3.1 Importance of Data Storytelling

Data storytelling is the practice of building a narrative around a set of data and its accompanying visualizations to convey insights effectively.

3.2 Techniques for Effective Data Storytelling

1. Know Your Audience: Tailor your story to the audience's level of understanding and interests.
2. Craft a Narrative: Create a logical flow from introduction to conclusion.
3. Use Visuals Wisely: Choose the right type of visualizations to support your story.
4. Highlight Key Insights: Focus on the most important data points and insights.
5. Provide Context: Explain why the data is relevant and what actions should be taken.

Example: Telling the Story of Sales Performance

- Introduction: Introduce the context and purpose of analyzing sales performance.
- Narrative: Discuss trends, highlight peak periods, and low-performing regions.
- Visuals: Use bar charts for regional sales, line charts for monthly trends, and pie charts for product category performance.
- Conclusion: Summarize key findings and suggest actionable insights.

4. Developing a Comprehensive BA Solution for a Real-World Business Problem

4.1 Identifying the Business Problem

Select a real-world business problem such as declining sales, customer churn, or supply chain inefficiencies.

4.2 Data Collection and Preparation

Gather relevant data from various sources, clean and preprocess the data for analysis.

4.3 Analysis and Visualization

Use BI tools to analyze the data and create visualizations that provide insights into the business problem.

4.4 Developing the Solution

Formulate a data-driven solution based on the insights gained. This could include strategic recommendations, operational changes, or new marketing strategies.

Example: Reducing Customer Churn

1. Problem Identification: High customer churn rate in a telecom company.
2. Data Collection: Customer data, usage patterns, feedback, and support tickets.
3. Data Analysis: Identify patterns and factors contributing to churn using BI tools.
4. Visualization: Create dashboards showing churn rates by demographics, usage, and satisfaction scores.
5. Solution Development: Recommend targeted customer retention strategies and improved customer service initiatives.

Conclusion

This lab covered the fundamental aspects of Business Intelligence, including the use of Tableau and Power BI for creating interactive dashboards and reports, the importance of data storytelling, and the development of comprehensive solutions for real-world business problems. Through practical exercises, students have gained hands-on experience in leveraging BI tools to derive actionable insights and make data-driven decisions.

References

- Tableau Software. (n.d.). Retrieved from (https://www.tableau.com/)
- Microsoft Power BI. (n.d.). Retrieved from (https://powerbi.microsoft.com/)

CONTENTS

Experiment 1: what is ETL process in power BI? Explain with example

The ETL (Extract, Transform, Load) process in Power BI is a fundamental step in preparing and transforming raw data from various sources into a format suitable for analysis and visualization within Power BI. Here's a breakdown of each step:

Extract: In this step, data is extracted from one or multiple sources. These sources can be databases, spreadsheets, web services, or any other data repositories. Power BI provides connectors to a wide range of data sources, allowing users to easily import data into their Power BI projects.

Transform: Once the data is extracted, it often needs to be cleaned, transformed, and structured to fit the desired analysis or visualization needs. Power BI offers a powerful set of data transformation tools, known as the Power Query Editor, to perform these tasks. Users can perform operations such as filtering, sorting, merging, appending, and applying calculations to the data to shape it into a usable form.

Load: After the data has been extracted and transformed, it is loaded into Power BI for analysis and visualization. Power BI provides options for loading data into its in-memory data model, which enables fast querying and interactive visualization. Depending on the data size and frequency of updates, users can choose to load data directly into memory or establish a scheduled refresh to keep the data up to date.

Here's an example to illustrate the ETL process in Power BI:

Let's say you work for a retail company and need to analyze sales data from multiple stores. The data is stored in different Excel files, one for each store, with different columns and formats.

1. Extract: You use Power BI to connect to each Excel file and extract the sales data from allthe stores.

2. Transform: In the Power Query Editor, you clean the data by removing any unnecessary columns, renaming columns for consistency, and converting data types to ensure uniformity across all files. You also merge the data from different stores into a single dataset and add calculated columns such as total sales amount or profit margin.

3. Load: Once the data is cleaned and transformed, you load it into Power BI's data model. From there, you can create various reports and dashboards to analyze sales performance across different stores, identify trends, and make data-driven decisions.

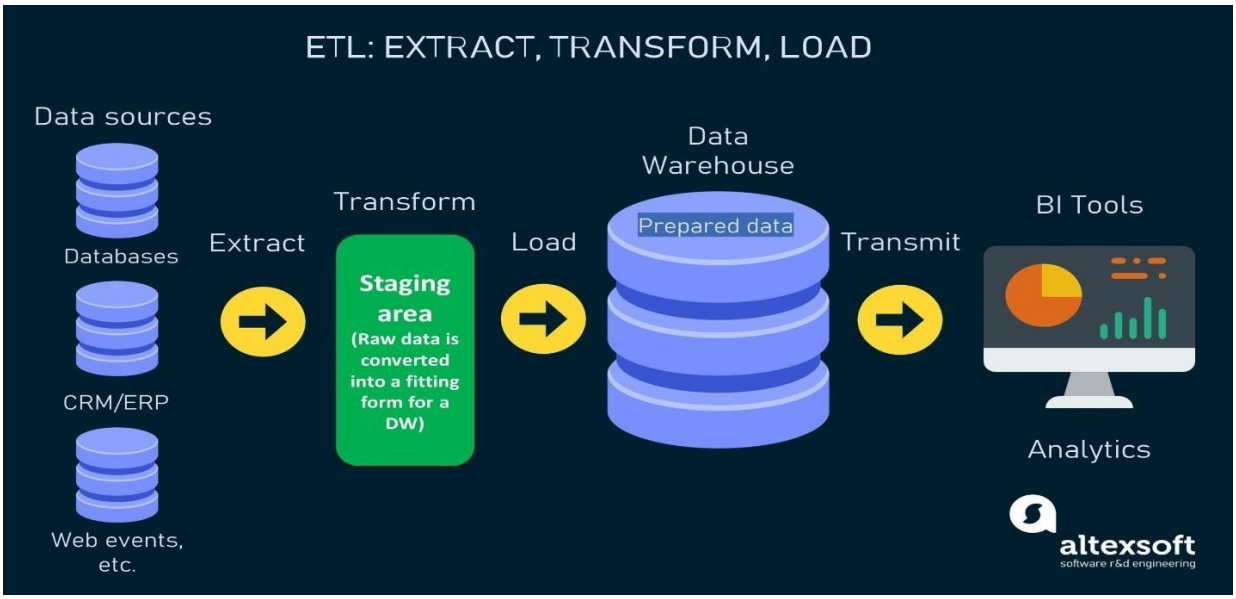
ETL: EXTRACT, TRANSFORM, LOAD
Data sources
Databases
CRM/ERP
Web events, etc.
Extract
Transform
Staging area
(Raw data is converted into a fitting form for a DW)
Load
Data Warehouse
Prepared data
Transmit
BI Tools
Analytics
altexsoft
software r&d engineering

Fig: GTY1

Experiment 2: what is data visualization and explain various tools for visualization of data?

Data visualization is the graphical representation of data and information. It involves the creation of visual elements such as charts, graphs, and maps to convey complex data in a clear and understandable manner. Data visualization helps in revealing trends, patterns, correlations, and outliers within datasets, enabling users to gain insights and make data-driven decisions effectively.

Fig: GTY2

Here are explanations of various tools commonly used for data visualization:

Tableau: Tableau is a leading data visualization tool that offers a user-friendly interface and powerful analytical capabilities. It allows users to create interactive dashboards, reports, and visualizations from various data sources without requiring extensive programming skills. Tableau supports a wide range of chart types and provides features for data exploration, analysis, and storytelling.

Power BI: Developed by Microsoft, Power BI is a business analytics tool that enables usersto visualize and analyze data from different sources. It offers a drag-and-drop interface for creating interactive reports and dashboards. Power BI integrates seamlessly with other Microsoft products and services, making it a preferred choice for organizations within the Microsoft ecosystem.

Google Data Studio: Google Data Studio is a free tool provided by Google for creating interactive dashboards and reports. It allows users to connect to various data sources such as Google Analytics, Google Sheets, and Big Query. Google Data Studio offers a wide range of visualization options and features for data exploration and collaboration.

D3.js: D3.js (Data-Driven Documents) is a JavaScript library widely used for creating custom and interactive data visualizations on the web. It provides developers with low-level

building blocks for creating highly customizable visualizations using HTML, SVG, and CSS. D3.js is popular for its flexibility and ability to create complex and dynamic visualizations.

Plotly: Plotly is a Python library that offers interactive and publication-quality visualizationsfor data analysis and exploration. It supports a wide range of chart types and can be used in various environments such as Jupyter Notebooks, web applications, and desktop applications. Plotly also provides APIs for integration with other programming languages and tools.

Matplotlib: Matplotlib is a widely-used Python library for creating static, animated, and interactive visualizations. It provides a high level of customization and flexibility for creating various types of plots and charts. Matplotlib is commonly used for data visualization in scientific research, data analysis, and machine learning projects.

QlikView/Qlik Sense: QlikView and Qlik Sense are business intelligence and data visualization platforms developed by Qlik. They enable users to create interactive dashboards, reports, and visualizations for analyzing and exploring data. QlikView offers guided analytics, while Qlik Sense provides self-service analytics capabilities for users to create their own visualizations.

Looker: Looker is a data exploration and business intelligence platform that provides tools for creating and sharing data visualizations and dashboards. It offers features such as embedded analytics, data modeling, and collaboration tools for analyzing and visualizing data effectively.

These are some of the popular tools used for data visualization, each offering unique features and capabilities to suit different user requirements and preferences.

Experiment 3: Create a Histogram for the given sales force data of Sathwik Yadav (P) Ltd?

Excel Data for Analysis

Supermarket Sales Data

Tax	10%

Order No	Order Date	Ship Date	Retail Price	Order Quantity	Tax	Total
1001	01-01-2024	03-01-2024	49.99	2	9.998	109.978
1002	01-01-2024	04-01-2024	29.99	1	2.999	32.989
1003	02-01-2024	07-01-2024	99.99	3	29.997	329.967
1004	02-01-2024	03-01-2024	19.99	4	7.996	87.956
1005	03-01-2024	08-01-2024	149.99	1	14.999	164.989
1006	03-01-2024	06-01-2024	79.99	2	15.998	175.978
1007	04-01-2024	06-01-2024	39.99	3	11.997	131.967
1008	04-01-2024	09-01-2024	69.99	2	13.998	153.978
1009	05-01-2024	06-01-2024	89.99	1	8.999	98.989
1010	05-01-2024	08-01-2024	199.99	1	19.999	219.989
1011	06-01-2024	07-01-2024	29.99	5	14.995	164.945
1012	06-01-2024	08-01-2024	79.99	2	15.998	175.978
1013	07-01-2024	09-01-2024	49.99	3	14.997	164.967
1014	07-01-2024	12-01-2024	129.99	1	12.999	142.989
1015	08-01-2024	13-01-2024	19.99	4	7.996	87.956
1016	08-01-2024	12-01-2024	149.99	1	14.999	164.989

1017	09-01-2024	14-01-2024	69.99	2	13.998	153.978
1018	09-01-2024	12-01-2024	39.99	3	11.997	131.967
1019	10-01-2024	11-01-2024	199.99	1	19.999	219.989
1020	10-01-2024	14-01-2024	29.99	5	14.995	164.945
1021	11-01-2024	14-01-2024	79.99	2	15.998	175.978
1022	11-01-2024	15-01-2024	49.99	3	14.997	164.967
1023	12-01-2024	17-01-2024	129.99	1	12.999	142.989
1024	12-01-2024	17-01-2024	19.99	4	7.996	87.956
1025	13-01-2024	17-01-2024	149.99	1	14.999	164.989
1026	13-01-2024	14-01-2024	69.99	2	13.998	153.978
1027	14-01-2024	18-01-2024	39.99	3	11.997	131.967
1028	14-01-2024	19-01-2024	199.99	1	19.999	219.989
1029	15-01-2024	19-01-2024	29.99	5	14.995	164.945
1030	15-01-2024	19-01-2024	79.99	2	15.998	175.978
1031	16-01-2024	19-01-2024	49.99	3	14.997	164.967
1032	16-01-2024	17-01-2024	129.99	1	12.999	142.989
1033	17-01-2024	19-01-2024	19.99	4	7.996	87.956
1034	17-01-2024	19-01-2024	149.99	1	14.999	164.989
1035	18-01-2024	23-01-2024	69.99	2	13.998	153.978
1036	18-01-2024	19-01-2024	39.99	3	11.997	131.967
1037	19-01-2024	20-01-2024	199.99	1	19.999	219.989
1038	19-01-2024	22-01-2024	29.99	5	14.995	164.945
1039	20-01-2024	24-01-2024	79.99	2	15.998	175.978
1040	20-01-2024	21-01-2024	49.99	3	14.997	164.967

1041	21-01-2024	26-01-2024	129.99	1	12.999	142.989
1042	21-01-2024	23-01-2024	19.99	4	7.996	87.956
1043	22-01-2024	25-01-2024	149.99	1	14.999	164.989
1044	22-01-2024	25-01-2024	69.99	2	13.998	153.978
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1046	23-01-2024	26-01-2024	199.99	1	19.999	219.989
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1051	26-01-2024	29-01-2024	19.99	4	7.996	87.956
1052	26-01-2024	28-01-2024	149.99	1	14.999	164.989
1053	27-01-2024	31-01-2024	69.99	2	13.998	153.978
1054	27-01-2024	31-01-2024	39.99	3	11.997	131.967
1055	28-01-2024	29-01-2024	199.99	1	19.999	219.989
1056	28-01-2024	29-01-2024	29.99	5	14.995	164.945
1057	29-01-2024	30-01-2024	79.99	2	15.998	175.978
1058	29-01-2024	31-01-2024	49.99	3	14.997	164.967
1059	30-01-2024	31-01-2024	129.99	1	12.999	142.989
1060	30-01-2024	01-02-2024	19.99	4	7.996	87.956
1061	31-01-2024	02-02-2024	149.99	1	14.999	164.989
1062	31-01-2024	04-02-2024	69.99	2	13.998	153.978
1063	01-02-2024	02-02-2024	39.99	3	11.997	131.967
1064	01-02-2024	05-02-2024	199.99	1	19.999	219.989

1065	01-02-2024	03-02-2024	29.99	5	14.995	164.945
1066	02-02-2024	06-02-2024	79.99	2	15.998	175.978
1067	03-02-2024	06-02-2024	49.99	3	14.997	164.967
1068	04-02-2024	05-02-2024	129.99	1	12.999	142.989
1069	04-02-2024	08-02-2024	19.99	4	7.996	87.956
1070	04-02-2024	07-02-2024	149.99	1	14.999	164.989

Table : GTY1

To create a histogram for the given sales force data in Power BI, you can follow these steps:

1. **Load Your Data:** Import your sales force data into Power BI. This typically involves connecting to your data source (such as an Excel file, database, or CSV file) andloading the relevant dataset into Power BI.

2. Navigate to the Report View:

Once your data is loaded, navigate to the "Report" view in Power BI Desktop.

3. **Add a Histogram Visualization**:

- In the "Visualizations" pane on the right side of the screen, select the "Histogram" visualization type (it looks like a bar chart with evenly spaced bars).

- Drag the field containing the sales data you want to analyze (e.g., the number of sales made by each salesperson) into the "Values" area of the visualization.

4. **Customize the Histogram:**

- You can adjust the bin size (the width of each bar in the histogram) by clicking on the "Format" pane (paint roller icon), selecting the "X-Axis" section, and adjusting the "Bin width" slider under "Histogram bins."

- You can also customize other aspects of the histogram, such as colors, labels, and axis formatting, using the options available in the "Format" pane.

5. **Review and Analyze**:

- Review the histogram to analyze the distribution of sales data.

- Pay attention to the frequency (or count) of sales within each bin, which is represented by the height of the bars on the histogram.

6. **Interact with the Data (Optional):**

- If you want to further analyze the data, you can interact with the histogram by slicing and filtering the data using other visualizations or slicers on the report canvas.

- For example, you could add a slicer for different sales regions or product categories to see how the distribution of sales varies across different segments.

7. Save and Share Your Report.

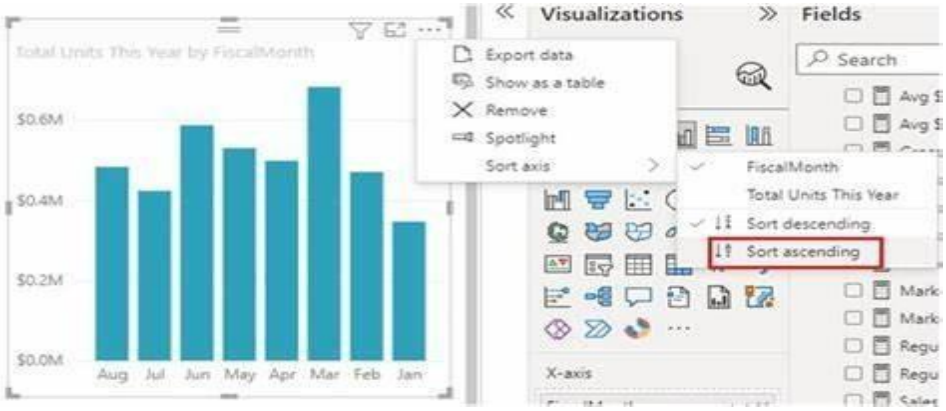


Fig: GTY3

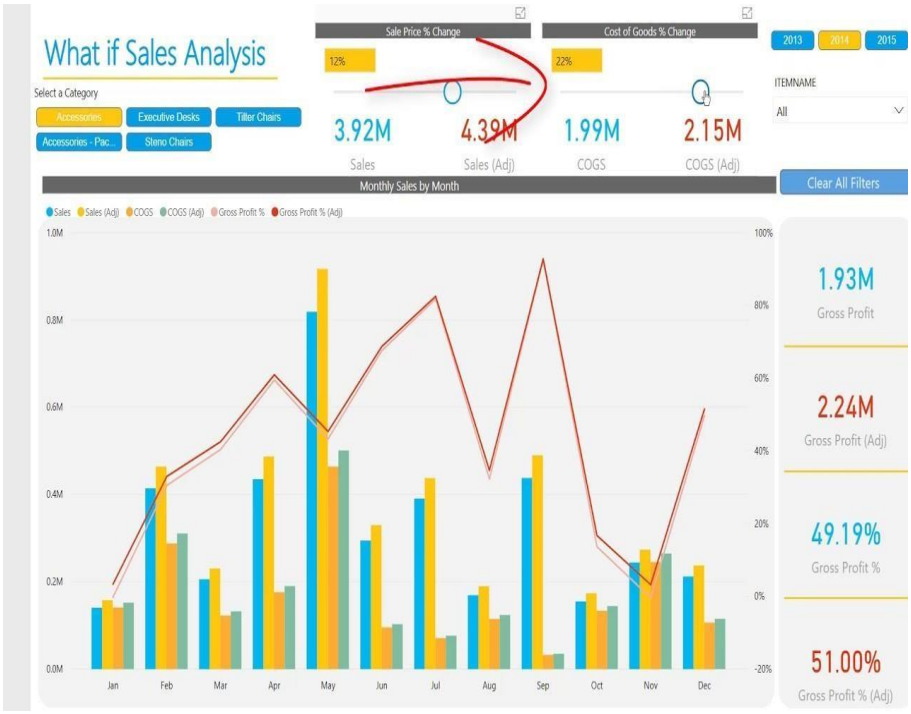


Fig: GTY4

Experiment 4: To create a data model in power BI with an example of 10 year sales and profit information of Sathwik Yadav company.

Excel Data for Analysis

Sales and Profit information of Sathwik Yadav company

Year	cost	Total cost	Retail Price	Order Quantity	Revenue	Profit
2015	40	80	49.99	2	99.98	19.98
2016	20	20	29.99	1	29.99	9.99
2017	50	150	99.99	3	299.97	149.97
2018	10	40	19.99	4	79.96	39.96
2019	100	100	149.99	1	149.99	49.99
2020	60	120	79.99	2	159.98	39.98
2021	25	75	39.99	3	119.97	44.97
2022	50	100	69.99	2	139.98	39.98
2023	40	40	89.99	1	89.99	49.99
2024	100	100	199.99	1	199.99	99.99

Table : GTY2

Creating a data model in Power BI involves importing data, defining relationships between tables, and creating measures and calculations. Below is an example of a simple data model for 10 years of sales and profit information.

1. Data Import:

Let's assume you have two main tables: `Sales` and `Profit`. Each table contains the following columns:

Sales Table:
- Date (Date of sale)
- Product ID (Identifier for the product sold)
- Sales Amount (Amount of sales)

Profit Table:
- Date (Date of profit)
- Product ID (Identifier for the product)
- Profit Amount (Amount of profit generated)

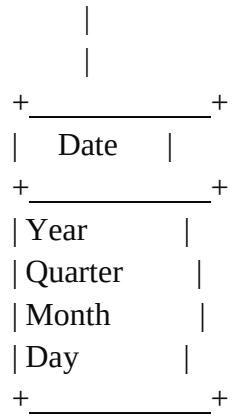
2. Relationships:
Both tables should have a one-to-many relationship with a common key, which is `Product ID`. Additionally, both tables should be connected through a relationship based on the `Date` column.

3. Measures and Calculations:
- Total Sales: This measure calculates the total sales across all years.
```
Total Sales = SUM(Sales[SalesAmount])
```
- Total Profit: This measure calculates the total profit across all years.
```
Total Profit = SUM (Profit[Profit Amount])
```
- Profit Margin (%): This measure calculates the profit margin percentage.
```
Profit Margin (%) = DIVIDE ([Total Profit], [Total Sales])
```

4. Visualization:
You can create various visualizations using these measures and dimensions. For example, you can create a line chart showing sales and profit over the years, a bar chart showing sales by product, or a table showing top-selling products by profit margin.

Here's how your data model might look visually in Power BI:

```
        +-----------------+         +-----------------+
        |     Sales       |         |     Profit      |
        +-----------------+         +-----------------+
        | Date            |<--------| Date            |
        | Product ID      |<--------| Product ID      |
        | Sales Amount    |         | Profit Amount   |
        +-----------------+         +-----------------+
                |                         |
                |                         |
                |                         |
                |                         |
                |                         |
                +-------------------------+
```



This is a basic representation of how your data model might look in Power BI. From here, you can build various reports and dashboards to analyse your sales and profit data over the 10-year period.

Experiment 5: What is a dashboard? Create a dashboard using excel data?

To create a powerful and visually appealing dashboard, Power BI is the tool for you. In this section, we'll guide you through the process of creating a Power BI dashboard from your existing Excel data. From preparing your data in Excel to customizing and formatting your dashboard, we'll cover all the necessary steps to help you create a professional-looking dashboard that will effectively communicate your data insights. Let's dive in!

Step 1: Prepare Your Data in Excel

Before creating a Power BI dashboard from Excel, it is important to properly prepare your data. Follow these steps to ensure a seamless process:

Organize your data: Begin by cleaning up your data, removing any unnecessary columns or rows, and ensuring that it is correctly formatted.

Check for errors: It is crucial to verify that there are no errors in your data, such as missing values or inconsistent formats. Correct any errors before proceeding.

Create relationships: If you have multiple data tables, establish relationships between them using common fields. This will allow Power BI to accurately combine and analyze the data.

Apply filters: Use filters to focus on specific subsets or time periods within your data. This will aid in visualizing and analyzing the data more effectively.

Format your data: Make your data more visually appealing by applying appropriate formatting, such as using headings, bold text, or highlighting key information.

By preparing your data in Excel before creating a Power BI dashboard, you can ensure the accuracy and significance of your visualizations and insights.

Step 2: Connect Excel Data to Power BI

To connect Excel data to Power BI, follow these steps:

Open Power BI Desktop.

Click on "Get Data" in the Home tab.

Select "Excel" from the list of data sources.

Navigate to and select your Excel file.

Choose the specific worksheet or range of data you want to import.

Click "Load" to import the data into Power BI.

Suggestions for connecting Excel data to Power BI:

Ensure your Excel data is clean and organized before importing.

Consider using named ranges in Excel to easily select specific data.

Regularly update the data in Power BI to maintain accuracy.

Take advantage of Power BI's transformation and cleaning options to enhance your data.

Step 3: Create Visualizations

To successfully create visualizations in your Power BI Dashboard from Excel, follow these steps:

Organize your data in Excel in a clean and accurate tabular format.

Connect your Excel data to Power BI by selecting the "Get Data" option and choosing the Excel file.

In the Power BI Desktop app, select the desired data fields and drag them onto the canvas to create visualizations such as charts, graphs, and tables.

Enhance the visual appeal of your dashboard by customizing and formatting it with titles, legends, colors, and other options.

By incorporating these steps, you can effectively create visualizations in your Power BI Dashboard from Excel and present your data in an informative and visually appealing manner.

Step 4: Customize and Format Your Dashboard

After creating visualizations in Power BI, the next step is to customize and format your dashboard to enhance its appearance and functionality.

Arrange and Resize Tiles: Drag and drop tiles to organize your dashboard layout. Resize them to optimize space.

Add Visualizations: Include additional visualizations to provide different perspectives on your data. Use a variety of chart types and formats.

Apply Filters: Implement filters to allow users to interact with the dashboard and drill down into specific data subsets.

Add Text and Images: Insert text boxes and images to provide context and enhance the overall design of your dashboard.

Apply Themes and Styles: Customize colors, fonts, and backgrounds to match your branding or personal preferences.

Set up Navigation: Add buttons or links to enable easy navigation between different pages or sections of your dashboard.

A business analyst used the aforementioned customization and formatting techniques to create a visually appealing and user-friendly dashboard for a sales team. The team was ableto quickly access and analyze real-time sales data, resulting in improved decision-making and increased sales performance.

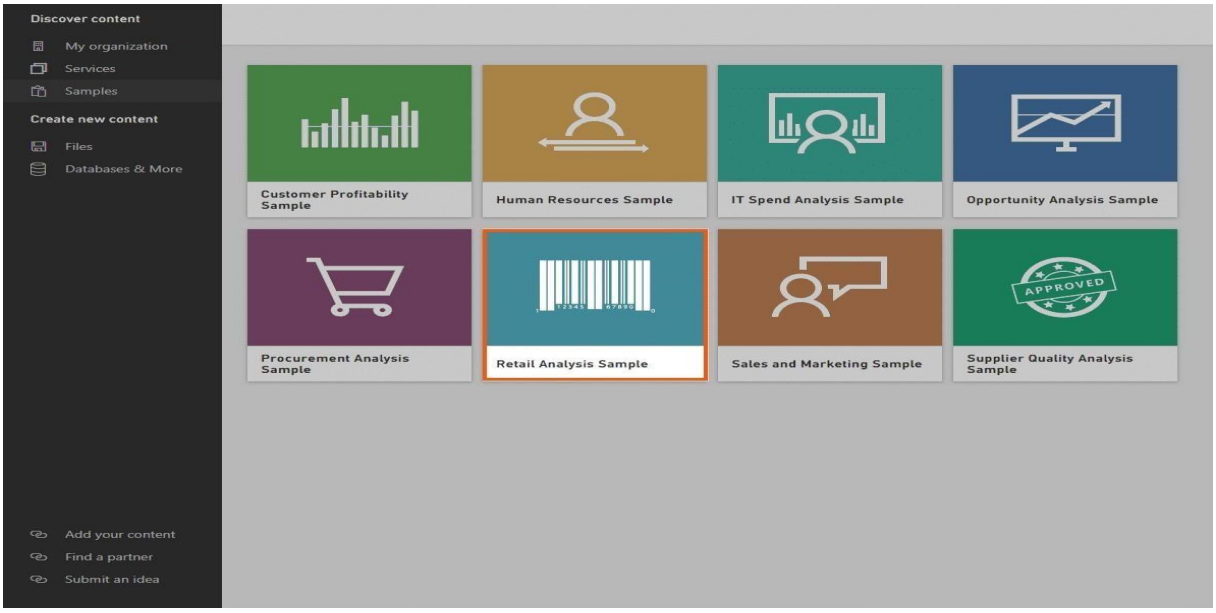


Fig: GTY5

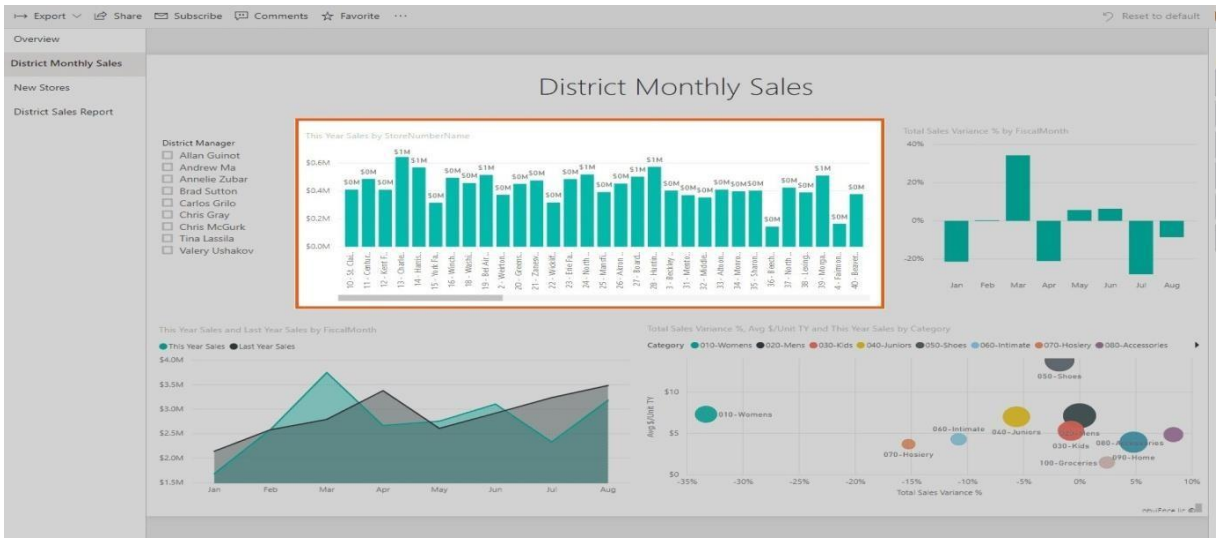


Fig: GTY6

Experiment 6: Explain the concept of creating a new column in power bi desktop with example?

Creating a new column in Power BI Desktop involves adding a calculated column to your dataset based on existing data or calculations. Here's how you can do it with an example:

Let's say you have a dataset containing sales data, and you want to create a new column calculating the total revenue for each sale.

1. Open your Power BI Desktop file and navigate to the "Data" view.

2. Select the table or query you want to add the new column to.

3. Click on the "Modeling" tab in the ribbon at the top.

4. In the "Tables" group, click on "New Column".

5. In the formula bar that appears, enter the calculation for your new column. For our example, you can enter a formula to multiply the "Quantity" column by the "Unit Price" column to calculate the total revenue for each sale. The formula would look like this:

```DAX

Total Revenue = 'Sales'[Quantity] * 'Sales'[Unit Price]

```

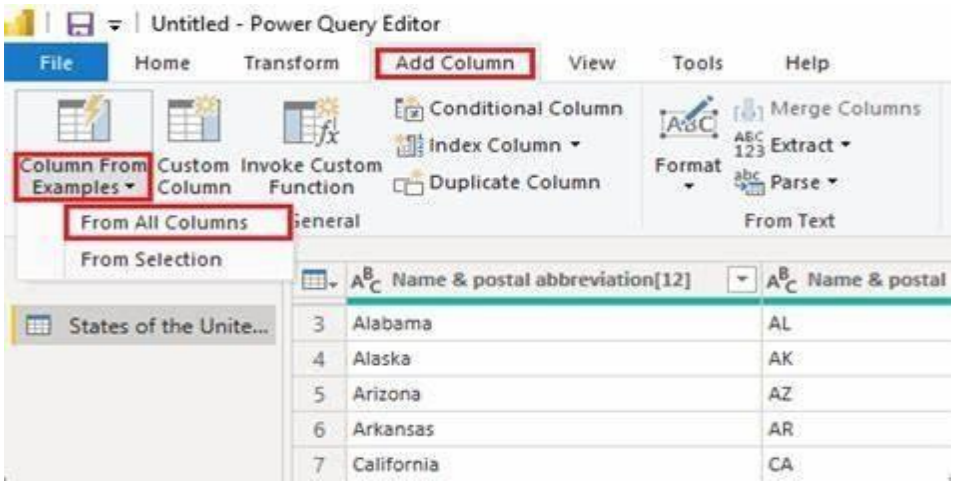
Here, 'Sales' is the name of the table containing your sales data, and [Quantity] and [Unit Price] are the names of the columns in that table.

6. Press Enter to apply the formula. Power BI Desktop will create a new column in your dataset called "Total Revenue" with the calculated values.

7. You can rename the new column if needed by right-clicking on its header and selecting "Rename".

8. Once you've created the new column, you can use it in your reports and visualizations just like any other column in your dataset.

By creating a new column in this way, you can perform various calculations and transformations on your data to derive insights and enhance your analysis in Power BI Desktop.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File
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Transform
Add Column
View
Tools
Help
Column From Examples
Custom Column
Invoke Custom Function
Conditional Column
Index Column
Duplicate Column
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Merge Columns
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Name & postal
3 Alabama AL
4 Alaska AK
5 Arizona AZ
6 Arkansas AR
7 California CA

Fig: GTY 7

Experiment 7: How to create a PIVOT table in power BI?

In Power BI, creating a Pivot Table equivalent is done through a visual called a Matrix visual. The Matrix visual is very similar to a Pivot Table in Excel, allowing you to aggregate and summarize data across rows and columns. Here's how you can create a Matrix visual in Power BI:

1. Open Power BI Desktop:

Launch Power BI Desktop and load your data into the report.

2. Select Matrix Visual:

From the Visualizations pane on the right side of the screen, select the Matrix visual icon. It looks like a table/grid with four squares.

3. Add Fields to Rows and Columns:

- Drag the fields you want to display on the rows to the Rows area in the Fields pane.

- Drag the fields you want to display on the columns to the Columns area in the Fields pane.

4. Add Values:

- Drag the fields you want to aggregate and summarize to the Values area in the Fields pane. These fields will be the numerical values you want to analyze, such as sales amount or profit.

- You can apply aggregation functions like Sum, Average, Count, etc., to these fields by clicking on the dropdown arrow next to the field in the Values area and selecting the desired aggregation function.

5. Adjust Formatting:

- You can customize the appearance of your Matrix visual by adjusting formatting options such as font size, color, alignment, etc.

- You can also expand or collapse rows and columns to view more or less detail.

6. Interact with the Visual:

- You can interact with the Matrix visual by clicking on rows or columns to drill down into more detailed data.

- You can also apply filters to the visual to focus on specific subsets of data.

7. Save and Publish:

- Once you're satisfied with your Matrix visual, you can save your Power BI report and publish it to the Power BI service to share it with others.

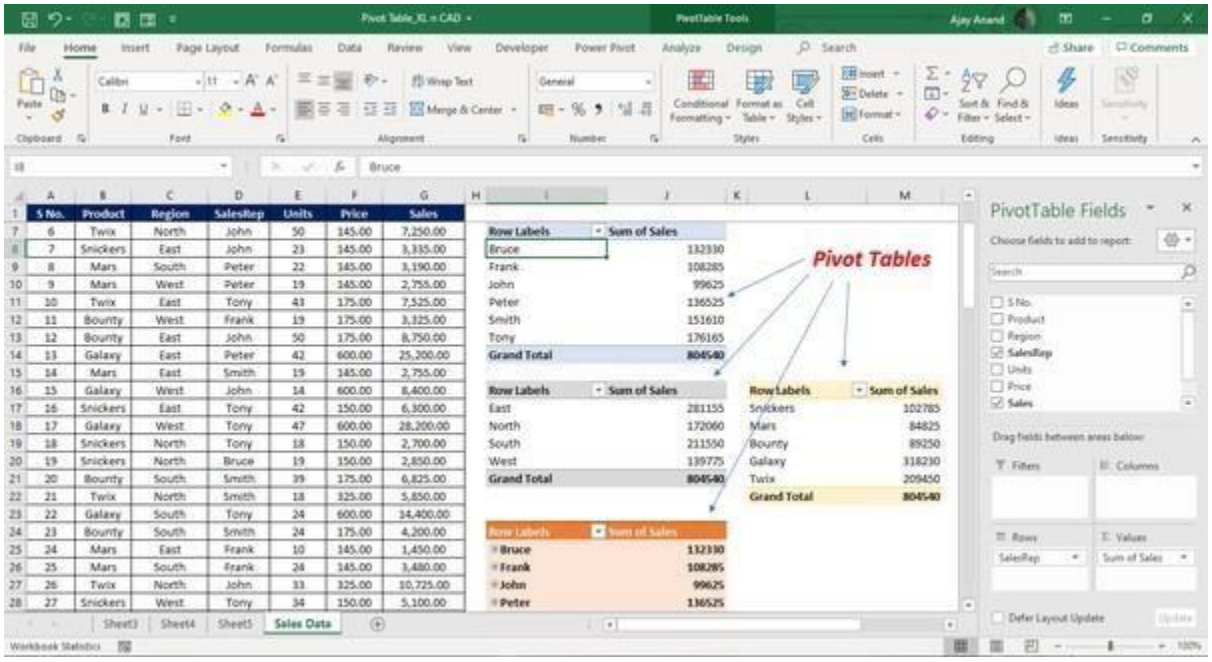

Fig: GTY 8

Experiment 8: Create a simple table in power BI desktop and visualize the data with the help of pie chart?

step-by-step process to creating a simple table and visualizing the data with a pie chart in Power BI Desktop:

Open Power BI Desktop:

Launch Power BI Desktop.

Connect to Data:

Connect to your data source by clicking on "Get Data" from the Home tab and selecting your desired data source.

Create a Table:

Once your data is loaded, go to the "Fields" pane on the right side of the screen. Drag the fields you want to include in your table to the "Table" visualization area in the center of the screen.

Customize the Table:

You can customize your table by rearranging columns, adjusting column widths, and applying formatting options such as font size, color, and alignment.

Create a Pie Chart:

Click on the "Pie Chart" icon in the Visualizations pane on the right side of the screen. It looks like a pie chart.

Drag the field you want to use for the pie chart to the "Values" area in the Fields pane. This field will be the one you want to visualize the distribution of, such as product categories or sales regions.

You can also drag additional fields to the "Legend" area to further segment the pie chart.

Customize the Pie Chart:

You can customize your pie chart by adjusting formatting options such as colors, labels, and data labels.

You can also enable or disable features like exploding slices or displaying percentages.

Interact with the Visual:

You can interact with the pie chart by clicking on slices to highlight or explode them.

You can also apply filters to the pie chart to focus on specific segments of your data.

Save and Publish:

- Once you're satisfied with your table and pie chart, save your Power BI report and publish it to the Power BI service to share it with others.

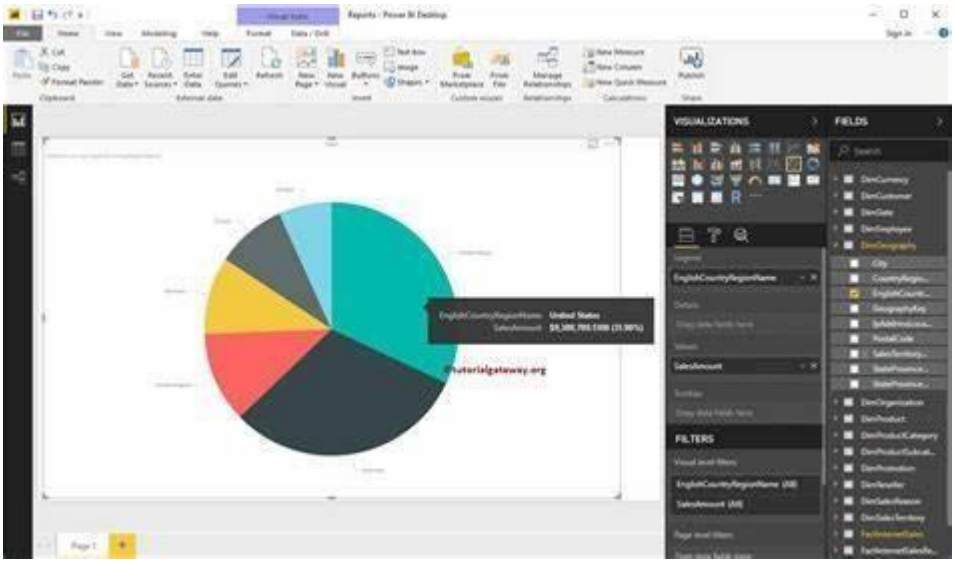

Fig: GTY 9

Experiment 9: Explain the steps to create a Business Report using power BI with example

Creating a business report using Power BI involves several steps, from data preparation to visualization and sharing insights. Below, I'll outline the steps with an example:

Step 1: Data Preparation

Data Gathering:

Identify the data sources needed for your report. This could be sales data, customer data, financial data, etc.

Data Import:

Use Power BI Desktop to import your data from various sources such as Excel, SQL databases, CSV files, etc.

Data Transformation:

Clean and transform your data as needed. This may include removing duplicates, handling missing values, merging tables, creating calculated columns, etc.

Step 2: Data Modeling

1. Define Relationships:

Identify the relationships between different tables in your dataset. Establish these relationships in Power BI to enable cross-table calculations.

2. Create Calculated Columns and Measures:

Create calculated columns and measures to perform calculations and aggregations on your data. For example, calculate total sales, average revenue per customer, etc.

Step 3: Visualization

1. Select Visualizations:

Choose appropriate visualizations to represent your data. Common visualizations include bar charts, line charts, pie charts, maps, etc.

2. Design Reports:

Design your report pages by arranging visualizations to effectively communicate insights. Consider the story you want to tell and organize your visualizations accordingly.

3. Apply Formatting:

Apply formatting options such as colors, fonts, and styles to make your report visually appealing and easy to understand.

Step 4: Analysis and Insights

1. Interact with Visualizations:

Use Power BI's interactive features to explore your data. Drill down into details, filter data, and highlight trends or outliers.

2. Identify Insights:

Analyze your visualizations to identify patterns, trends, and insights in your data. Look for areas of opportunity or areas that require attention.

Step 5: Sharing and Collaboration

1. Publish to Power BI Service:

Publish your report to the Power BI service to share it with others. This allows stakeholders to access the report online and interact with it.

2. Create Dashboards:

Create dashboards in the Power BI service by pinning visualizations from your report. Dashboards provide a high-level view of key metrics and KPIs.

3. Collaborate with Colleagues:

Share your report and dashboards with colleagues and stakeholders. Collaborate on insights, discuss findings, and make data-driven decisions together.

Example: Sales Performance Report

Let's say you're creating a sales performance report for a retail company. Your report may include visualizations such as:

- Total sales by product category (bar chart)

- Monthly sales trend over time (line chart)

- Sales distribution by region (pie chart)

- Top-selling products (table)

You'll analyze these visualizations to identify trends in sales, understand regional performance, and identify top-performing products. Finally, you'll share your insights with the sales team to inform strategic decisions.

Fig: GTY 10

Experiment 10: What is power query and how it is useful for analyzing the data in power BI?

Power Query is a data connectivity and data preparation technology available in Power BI (as well as Excel and other Microsoft products). It allows users to easily connect to various data sources, transform and shape the data, and load it into their Power BI models. Here's how Power Query is useful for analyzing data in Power BI:

1. Data Integration:

Power Query enables users to connect to a wide range of data sources, including databases, Excel files, CSV files, web pages, and more. This makes it easy to bring in data from different sources into Power BI for analysis.

2. Data Transformation:

Power Query provides a user-friendly interface for transforming and cleaning data. Users can perform various operations such as filtering rows, removing duplicates, changing data types, splitting columns, merging tables, and more. This ensures that the data is in the right format and structure for analysis.

3. Data Enrichment:

With Power Query, users can enrich their data by adding calculated columns, aggregating data, or performing lookups against other tables. This allows for deeper analysis and better insights into the data.

4. Data Quality:

Power Query includes features for data quality assessment and data profiling. Users can identify and address data quality issues such as missing values, outliers, and inconsistencies, ensuring that the data is accurate and reliable for analysis.

5. Automated Data Refresh:

Power Query supports automated data refresh, allowing users to schedule data refreshes to keep their Power BI reports up-to-date with the latest data from the source systems. This ensures that users are always working with the most current information.

6. Reusable Queries:

Users can create reusable queries in Power Query, which can be applied to multiple datasets or refreshed with new data. This saves time and effort by eliminating the need to repeat the same data preparation steps for different datasets.

Overall, Power Query is a powerful tool for data preparation and transformation, enabling users to easily clean, shape, and enrich their data before analyzing it in Power BI. It helps ensure that the data is accurate, consistent, and ready for insightful analysis.

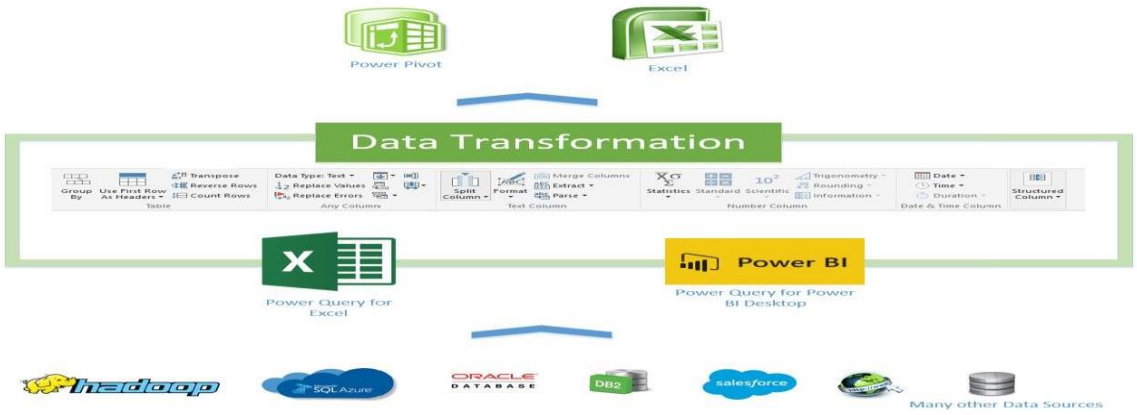

Fig: GTY11

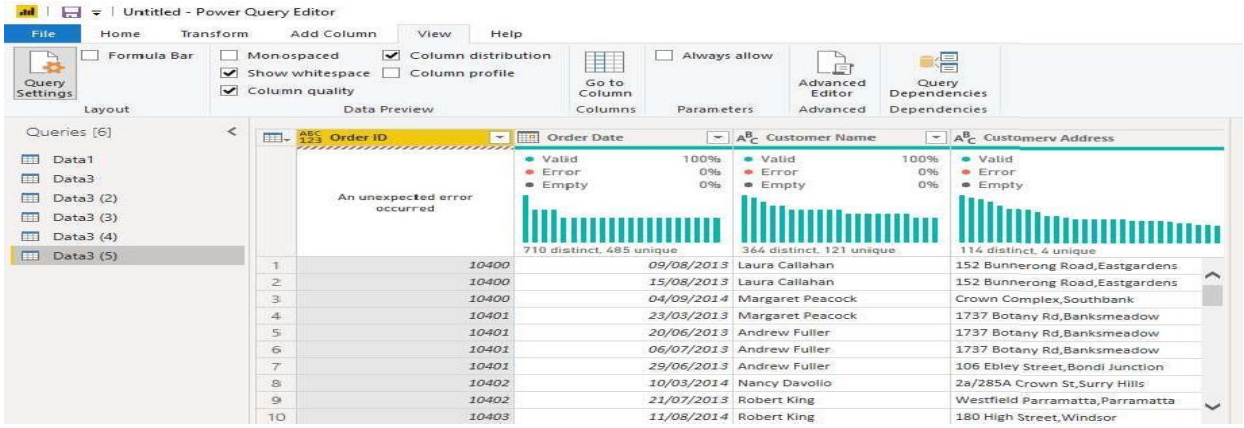

Fig: GTY 12

Experiment 11: Explain the steps involved in collecting and preparing data for visualization in Tableau.

Certainly! Here are the steps involved in collecting and preparing data for visualization in Tableau:

Step 1: Data Collection

1. Identify Data Sources:

Determine the sources of data you'll need for your visualization. This could include databases, spreadsheets, web data connectors, cloud services, etc.

2. Gather Data:

Collect the necessary data from your identified sources. Ensure that you have access to the data and that it's in a format that Tableau can use (e.g., CSV, Excel, text files, databases).

Step 2: Data Preparation

1. Connect to Data Source:

Open Tableau and connect to your data source. Tableau provides various options for connecting to different types of data sources.

2. Data Import:

Import your data into Tableau. You can either connect live to your data source or import a copy of the data into Tableau's data engine.

3. Clean and Shape Data:

Clean and prepare your data for analysis. This may involve tasks such as removing duplicates, handling missing values, renaming fields, creating calculated fields, and reshaping the data structure as needed.

4. Join or Blend Data (if necessary):

If your analysis requires data from multiple sources, you may need to join or blend the data together in Tableau. Joins combine data from different tables based on a common field, while blending combines data from different data sources while keeping them separate.

5. Create Calculations and Calculated Fields:

Create calculated fields in Tableau to perform calculations and derive new insights from your data. This can include mathematical operations, string manipulations, logical expressions, and more.

6. Apply Filters and Parameters:

Apply filters and parameters to your data to control what data is included in your visualization and give users interactive control over the data.

7. Aggregate Data (if necessary):

Depending on your analysis requirements, you may need to aggregate your data to a higher level (e.g., summing sales by month instead of by day) using Tableau's aggregation functions.

Step 3: Visualization

1. Select Visualization Types:

Choose the appropriate visualization types for your data and analysis goals. Tableau offers a wide range of visualization options, including bar charts, line charts, scatter plots, maps, heat maps, and more.

2. Drag and Drop Fields:

Drag and drop fields from your data pane onto the shelves in Tableau to create visualizations. For example, drag a numeric field onto the Rows or Columns shelf to create a chart, or drag a categorical field onto the Color or Shape shelf to add additional visual encoding.

3. Customize Visualizations:

Customize your visualizations by adjusting formatting options, colors, labels, tooltips, and other visual properties to improve readability and communicate insights effectively.

4. Create Dashboards and Stories:

Combine multiple visualizations into dashboards and stories to create interactive presentations and narratives that tell a compelling data-driven story.

Step 4: Analysis and Iteration

1. Interact with Visualizations:

Interact with your visualizations to explore your data and discover insights. Use Tableau's interactive features such as tooltips, filters, highlighting, and drill-down to analyze your data from different perspectives.

2. Iterate and Refine:

Iterate on your visualizations based on feedback and insights gained during analysis. Experiment with different visualization types, layouts, and configurations to refine your visualizations and improve their effectiveness.

Step 5: Sharing and Collaboration

1. Share Insights:

Share your visualizations and insights with stakeholders, colleagues, or clients. Tableau provides options for sharing visualizations via Tableau Server, Tableau Online, Tableau Public, or exporting visualizations to static formats like PDF or images.

2. Collaborate with Others:

Collaborate with others by allowing them to interact with your visualizations, provide feedback, and explore the data on their own. Tableau's sharing and collaboration features enable seamless collaboration and communication around data-driven insights.

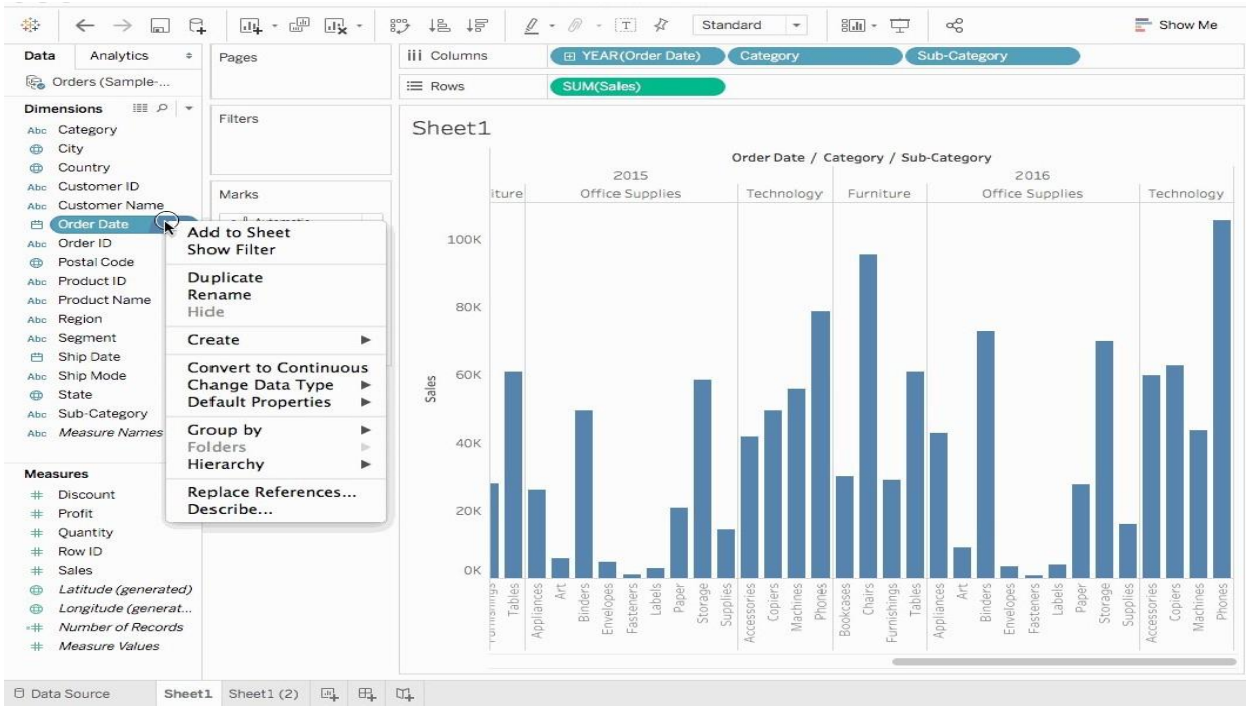

Fig: GTY 13

Experiment 12: **Briefly Explain various data Aggregation and statistical functions used in Tableau**

Certainly! Tableau offers a variety of data aggregation and statistical functions that enable users to perform calculations and analyze data in their visualizations. Here's a brief explanation of some commonly used aggregation and statistical functions in Tableau:

Data Aggregation Functions:

1. SUM ( ):

Computes the sum of the values in a field.Useful for aggregating numeric data, such as sales amounts or quantities.

2. AVG ( ):

Computes the average of the values in a field.Calculates the mean value of numeric data.

3. MIN ( ):

Returns the minimum value in a field.Useful for finding the smallest value in a dataset.

4. MAX ( ):

Returns the maximum value in a field.Useful for finding the largest value in a dataset.

5. COUNT ( ):

Counts the number of items in a field.Can be used to count the number of records or occurrences of a particular value.

6. COUNTD ( ):

Counts the number of distinct items in a field.Useful for counting unique values.

7. MEDIAN ( ):

Computes the median of the values in a field.Represents the middle value in a dataset when sorted in ascending order.

8. STDEV ( ) / STDEVP ( ):

Calculates the standard deviation of the values in a field.Measures the dispersion of data points around the mean.

Statistical Functions:

1. CORR ( ):

Calculates the correlation coefficient between two numeric fields.Measures the strength and direction of the linear relationship between variables.

2. VAR ( ) / VARP ( ):

Computes the variance of the values in a field.Measures the average squared deviation from the mean.

3. SKEWNESS ( ):

Calculates the skewness of the distribution of values in a field.Measures the asymmetry of the distribution.

4. KURTOSIS():

Computes the kurtosis of the distribution of values in a field.Measures the "peakedness" or "tailedness" of the distribution.

5. NTH():

Returns the nth value in a sorted list of values.Useful for finding percentile values or ranking data.

6. RANK():

Assigns a rank to each value in a field based on a specified ordering. Useful for ranking data based on certain criteria.

These are just a few examples of the aggregation and statistical functions available in Tableau. By leveraging these functions, users can perform a wide range of calculations and analyses to gain insights from their data visualizations.

Experiment 13: What are the different visualization operations performed on data in Tableau

In Tableau, there are various visualization operations that can be performed on data to create insightful and meaningful visualizations. Here are some of the key visualization operations:

1. Drag and Drop:

The primary method of building visualizations in Tableau is by dragging and dropping fields from your data pane onto the shelves (Rows, Columns, Marks, Filters) in the visualization canvas.

2. Marks Card:

The Marks Card allows users to control the appearance and behavior of marks in the visualization. It enables users to encode data using different visual properties such as color, size, shape, label, tooltip, and detail.

3. Filters:

Filters allow users to control which data is included in the visualization. Tableau provides various types of filters, including categorical filters, continuous filters, relative date filters, and context filters.

4. Sorting:

Tableau enables users to sort data within visualizations based on the values of specific fields. Users can sort data in ascending or descending order, as well as by a specific measure.

5. Aggregation:

Tableau automatically aggregates data based on the visualization type and the fields included in the visualization. Users can control the level of aggregation using functions such as SUM(), AVG(), MIN(), MAX(), etc.

6. Grouping and Binning:

Users can group data together based on common characteristics using the grouping feature. Binning allows users to group numeric data into discrete bins or ranges.

7. Dual-Axis and Combo Charts:

Tableau supports dual-axis charts, where two measures are plotted on separate axes within the same visualization. Users can also create combo charts by overlaying different chart types (e.g., line chart and bar chart) on the same axis.

8. Annotations:

Annotations allow users to add additional context or insights to their visualizations. Annotations can include text, shapes, lines, and images, and can be placed directly on the visualization canvas.

9. Trend Lines and Reference Lines:

Tableau enables users to add trend lines and reference lines to visualizations to highlight trends or compare data against a reference point. Trend lines can be linear, logarithmic, exponential, or polynomial.

10. Dashboard Interactions:

Users can create interactive dashboards in Tableau by combining multiple visualizations onto a single dashboard canvas. Users can define interactions between visualizations, allowing users to filter or highlight data in one visualization based on selections made in another.

These are just a few examples of the visualization operations that can be performed in Tableau. Tableau offers a wide range of features and capabilities for creating rich, interactive, andinsightful visualizations from your data.

Experiment 14: What is mean by KPI? How the stakeholders of a company need KPI'S to understand the business at glance? (Example)

KPI stands for Key Performance Indicator. A KPI is a measurable value that demonstrates how effectively a company is achieving its key business objectives and goals. KPIs are used to evaluate the success of an organization or a specific activity in which it engages. They help stakeholders understand the performance and health of the business at a glance by providing clear, quantifiable metrics that reflect progress towards strategic objectives.

Stakeholders of a company, including executives, managers, investors, and employees, rely on KPIs to understand the business in several ways:

1. Monitoring Progress: KPIs provide stakeholders with real-time or periodic updates on the progress of critical business activities and initiatives. By tracking KPIs regularly, stakeholders can quickly assess whether the company is on track to meet its objectives.

2. Identifying Areas for Improvement: KPIs highlight areas of the business that are performing well and areas that may need improvement. By analyzing KPI data, stakeholders can identify trends, patterns, and anomalies that may require further investigation or action.

3. Setting Goals and Targets: KPIs help stakeholders set specific, measurable goals and targets for the organization. By establishing KPI benchmarks, stakeholders can define what success looks like and track performance against these benchmarks over time.

4. Making Informed Decisions: KPIs provide stakeholders with actionable insights that enable them to make informed decisions about resource allocation, strategy development, and business operations. KPI data helps stakeholders prioritize initiatives and allocate resources effectively to drive desired outcomes.

5. Driving Accountability: KPIs create accountability within the organization by setting clear expectations for performance and measuring progress against those expectations. Stakeholders can hold individuals and teams accountable for achieving KPI targets, fostering a culture of accountability and performance excellence.

Example:

Let's consider a retail company that wants to measure its sales performance using KPIs. Some KPIs that stakeholders may use to understand the business at a glance include:

1. Total Sales Revenue: This KPI measures the total revenue generated by the company overa specific period. Stakeholders can track this KPI monthly, quarterly, or annually to assess overall sales performance.

2. Sales Growth Rate: This KPI calculates the percentage increase or decrease in sales revenue compared to the previous period. Stakeholders can use this KPI to gauge the company's sales momentum and identify trends over time.

3. Average Order Value (AOV): This KPI measures the average amount spent by customersin a single transaction. Stakeholders can monitor AOV to understand customer purchasingbehavior and assess the effectiveness of marketing and pricing strategies.

4. Customer Retention Rate: This KPI measures the percentage of customers who continue to make purchases from the company over time. Stakeholders can use this KPI to evaluate customer loyalty and satisfaction and identify opportunities to improve retention efforts.

By tracking these KPIs, stakeholders can gain valuable insights into the company's sales performance, identify areas for improvement, and make data-driven decisions to drive business growth and success.

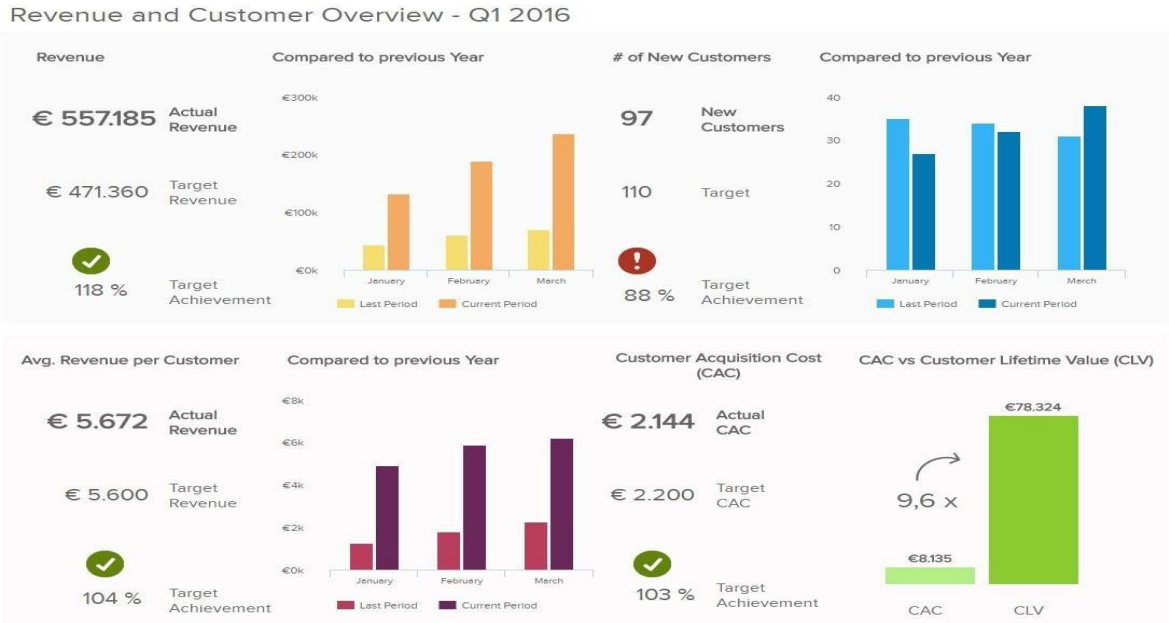

Fig: GTY 14

Experiment 15: Create visually appealing and informative report that summarize keyfinding from your data analysis. Include relevant charts, tables and titles using Tableau

As an AI language model, I'm unable to directly create visualizations in Tableau. However, I can guide you on how to create a visually appealing and informative report in Tableau based on your data analysis findings. Here's how you can do it:

1. Identify Key Findings:

Start by summarizing the key findings from your data analysis. What insights did you uncover? What are the main takeaways that you want to communicate to your audience?

2. Select Relevant Charts and Visualizations:

Choose the most appropriate charts and visualizations to present your key findings. This could include bar charts, line charts, pie charts, scatter plots, maps, etc., depending on the nature of your data and the insights you want to convey.

3. Create a Dashboard:

Open Tableau and create a new dashboard. Arrange your selected charts and visualizations on the dashboard canvas to create a cohesive and visually appealing layout. Use containers and layout containers to organize your content effectively.

4. Add Titles and Annotations:

Provide clear and descriptive titles for each chart and visualization to indicate what the data represents. Use annotations, text boxes, and captions to add context and explanations where necessary.

5. Use Color and Formatting:

Apply a consistent color scheme and formatting to your visualizations to make them visually appealing and easy to understand. Use colors strategically to highlight important data points or trends.

6. Include Interactive Elements:

Take advantage of Tableau's interactive features to enhance the user experience. Add filters, parameters, and actions to allow users to interact with the data and explore different aspects of the analysis.

7. Create Summary Tables:

In addition to charts and visualizations, include summary tables to present key metrics and numbers in a clear and concise format. Use formatting options such as bold text, shading, and borders to make the tables easy to read.

8. Test and Iterate:

Once you've created your dashboard, review it carefully to ensure that it effectively communicates your key findings. Test the interactivity and functionality to make sure everything works as expected. Iterate on your design as needed to refine and improve the presentation.

9. Share and Present:

Share your Tableau dashboard with your audience by publishing it to Tableau Server, Tableau Online, or Tableau Public. Alternatively, you can export the dashboard as a PDF or image file for offline sharing or presentation purposes.

Fig: GTY 15

Experiment 16: Create a Bar chart to visualize total sales by product category. Explore sorting options to highlight top selling categories using Tableau?

To create a bar chart to visualize total sales by product category and explore sorting options to highlight top-selling categories in Tableau, follow these steps:

1. Connect to Your Data:

Open Tableau Desktop and connect to your data source that contains the sales data by product category.

2. Drag Product Category and Sales Amount to Rows and Columns:

- From the Data pane, drag the "Product Category" field to the Columns shelf.

- Drag the "Sales Amount" field to the Rows shelf.

3. Change Visualization Type to Bar Chart:

- In the Show Me panel (usually located at the top-right corner), select the "Bar Chart" option.

4. Sort Bars by Total Sales:

- Right-click on the axis of the bar chart (either the horizontal or vertical axis, depending on how your chart is displayed) and select "Sort."

- Choose "Field" and select the "Sales Amount" field.

- Choose the desired sorting order (e.g., descending) to sort the bars by total sales amount.

5. Highlight Top Selling Categories:

- To highlight the top-selling categories, you can either:

a. Filter the bar chart to show only the top N categories by sales amount:

- Right-click on the "Product Category" axis and select "Filter."

- Choose the "Top" tab, select "By Field," and choose the "Sales Amount" field.

- Specify the number of categories you want to display (e.g., top 5).

b. Use color encoding to visually highlight the top-selling categories:

- Drag the "Product Category" field to the Color shelf.

- Right-click on the "Sales Amount" legend and select "Sort."

- Choose "Field" and select the "Sales Amount" field.

- Choose the desired sorting order (e.g., descending) to sort the color legend by total sales amount.

6. Format and Customize:

- Customize the appearance of the bar chart by adjusting colors, labels, titles, and other formatting options to make it visually appealing and easy to interpret.

7. Interact and Analyze:

- Interact with the bar chart to analyze the sales by product category. You can hover over the bars to view detailed sales amounts, drill down into specific categories, or apply filters to further refine the analysis.

8. Save and Share:

- Once you're satisfied with your bar chart, save your Tableau workbook and share it with others. You can publish it to Tableau Server, Tableau Online, or export it as an image or PDF forsharing and presentation purposes.

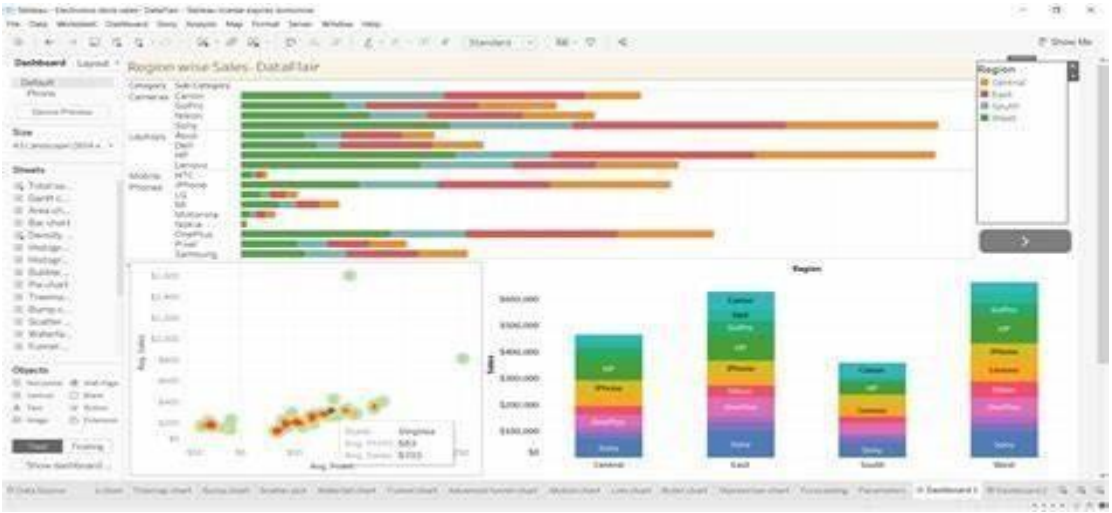

Fig: GTY 16

Experiment 17: Explain How you would tailor your Dashboard for different Audiences (Example: Management Vs Sales Team) to emphasize relevant for each group using Tableau?

Tailoring a dashboard for different audiences, such as management and the sales team, involves understanding the specific needs, interests, and objectives of each group and designing the dashboard to emphasize relevant information accordingly. Here's how you can tailor a dashboard for each audience using Tableau:

Dashboard for Management:

1. High-Level Overview:

Provide a high-level overview of key performance indicators (KPIs) and metrics relevant to management's strategic objectives. Include summary visualizations that highlight overall performance and trends.

2. Executive Summary:

Create a dedicated section or summary visualization that presents a concise summary of the most important insights and findings. Use clear, easy-to-understand visualizations and annotations to communicate key takeaways at a glance.

3. Strategic Insights:

Focus on visualizations that provide strategic insights and support decision-making at the organizational level. Include trend analysis, comparisons against targets or benchmarks, and projections to help management understand the implications of different strategic initiatives.

4. Customized Views:

Incorporate interactive features such as filters, parameters, and drill-down capabilities to allow management to explore data at different levels of detail. Provide options for customization so that management can focus on specific areas of interest or drill into specific segments of the business.

5. Actionable Recommendations:

Include actionable recommendations or insights based on the data analysis to guide decision-making and strategic planning. Use annotations, text boxes, and annotations to provide context and recommendations for action.

Fig: GTY 17

Dashboard for Sales Team:

1. Sales Performance Metrics:

Highlight key sales performance metrics that are relevant to the sales team's daily operations and targets. Include visualizations such as sales trends, pipeline analysis, and individual performance metrics.

2. Pipeline and Opportunities:

Provide visibility into the sales pipeline and opportunities to help the sales team prioritize leads, track progress, and identify areas for growth. Include visualizations such as funnel charts, pipeline by stage, and win/loss analysis.

3. Account and Customer Insights:

Include visualizations that provide insights into customer behavior, preferences, and buying patterns. Include customer segmentation analysis, customer lifetime value, and churn analysis to help the sales team understand their customer base and target their efforts effectively.

4. Performance Benchmarking:

Compare individual and team performance against targets, quotas, and benchmarks to motivate the sales team and drive performance improvement. Include visualizations such as leaderboards, performance scorecards, and variance analysis.

5. Real-Time Updates:

Incorporate real-time or near-real-time data updates to provide the sales team with the latest information on leads, opportunities, and performance metrics. Use data alerts and notifications to highlight critical updates or changes in the sales pipeline.

6. Training and Resources:

Provide access to training materials, resources, and best practices directly within the dashboard to support the ongoing development and training needs of the sales team. Include links to relevant documents, training videos, and knowledge bases.

By tailoring the dashboard for different audiences, you can ensure that each group receives the information and insights they need to make informed decisions, drive performance, and achieve their objectives effectively.

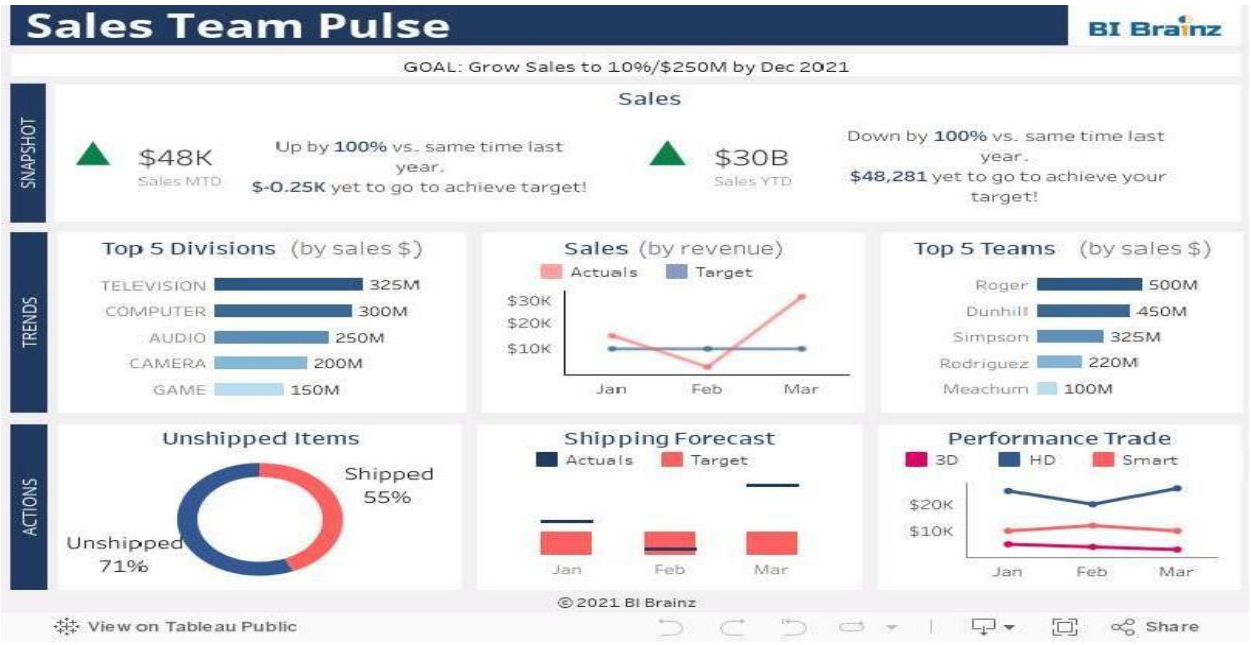

Fig: GTY 18

Experiment 18: Create a Scatter plot to analyze the relationship between sales amount and product price. Consider adding a trend line to identify any correlations

To create a scatter plot in Tableau to analyze the relationship between sales amount and product price and add a trend line to identify any correlations, follow these steps:

1. Connect to Your Data:

Open Tableau Desktop and connect to your data source that contains the sales data including product price and sales amount.

2. Drag Sales Amount and Product Price to Rows and Columns:

- From the Data pane, drag the "Sales Amount" field to the Columns shelf.

- Drag the "Product Price" field to the Rows shelf.

3. Change Visualization Type to Scatter Plot:

- In the Show Me panel (usually located at the top-right corner), select the "Scatter Plot" option.

4. Add Trend Line:

- Right-click on one of the data points in the scatter plot.

- Select "Trend Lines" from the context menu.

- Choose the type of trend line you want to add (e.g., linear, logarithmic, polynomial).

- Tableau will automatically add the trend line to the scatter plot and display the equation and R-squared value, indicating the strength and direction of the correlation.

5. Format and Customize:

- Customize the appearance of the scatter plot by adjusting colors, shapes, labels, and other formatting options to make it visually appealing and easy to interpret.

6. Interact and Analyze:

- Interact with the scatter plot to analyze the relationship between sales amount and product price. You can hover over the data points to view detailed information, use tooltips to display additional data, and apply filters to further refine the analysis.

7. Test and Iterate:

- Review the scatter plot to ensure that it effectively communicates the relationship between sales amount and product price. Test the interactivity and functionality to make sure everything works as expected. Iterate on your design as needed to refine and improve the visualization.

8. Save and Share:

- Once you're satisfied with your scatter plot, save your Tableau workbook and share it with others. You can publish it to Tableau Server, Tableau Online, or export it as an image or PDF for sharing and presentation purposes.

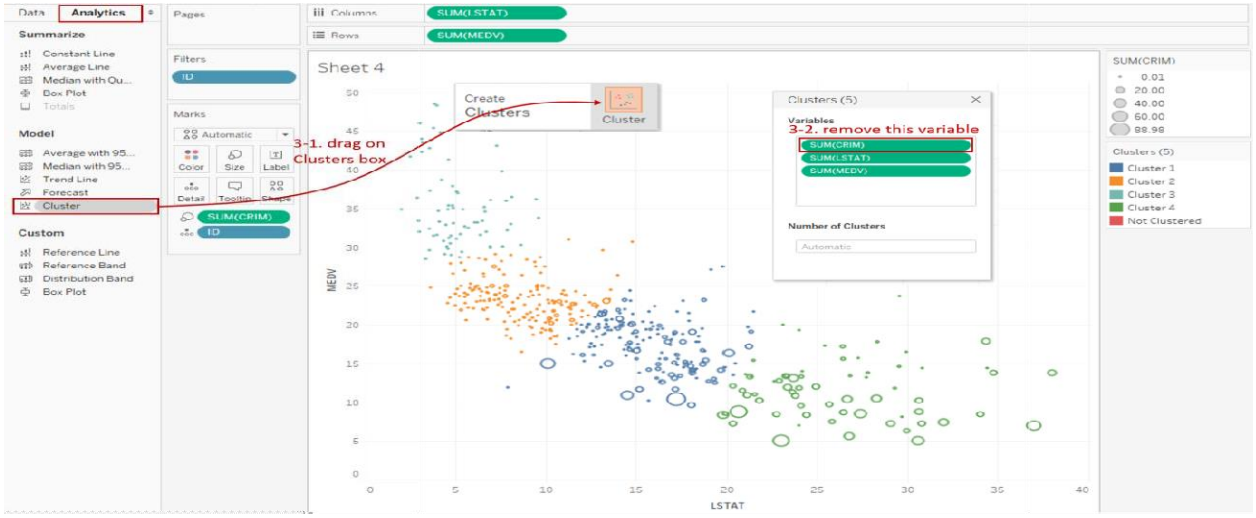

Fig: GTY 19

Experiment 19: Get a Data set containing supply chain data, include inventory levels, lead times and supplier performance metrics from web source and design visualizations to identify bottle necks, optimize inventory management and improve supply chain efficiency. Use tools like heat maps.

As an AI language model, I don't have direct access to external web sources to fetch data. However, I can guide you on how to design visualizations for supply chain optimization using a hypothetical dataset containing inventory levels, lead times, and supplier performance metrics. Here's how you can approach it:

1. Data Collection:

- Identify potential sources for supply chain data containing inventory levels, lead times, and supplier performance metrics. This may include ERP systems, databases, or APIs from your organization or third-party providers.

2. Data Preparation:

- Gather and clean the data, ensuring that it is formatted correctly and free from errors or inconsistencies. Merge datasets if necessary to create a comprehensive dataset for analysis.

3. Data Analysis and Visualization:

a. Inventory Levels:

- Create a heatmap to visualize inventory levels across different product categories, warehouses, or time periods. Identify areas of excess inventory or shortages that could indicate potential bottlenecks.

b. Lead Times:

- Use a heatmap to visualize lead times for different suppliers or product categories. Identify suppliers with longer lead times that may be causing delays in the supply chain.

c. Supplier Performance Metrics:

- Create visualizations such as bar charts or line charts to analyze supplier performance metrics such as on-time delivery rates, quality scores, and lead time variance. Identify underperforming suppliers that may need to be addressed.

d. Inventory Optimization:

- Use scatter plots or bubble charts to visualize the relationship between inventory levels, lead times, and supplier performance metrics. Identify opportunities to optimize inventory management by adjusting order quantities, safety stock levels, or supplier selection.

e. Supply Chain Efficiency:

- Create a dashboard that combines all relevant visualizations to provide a comprehensive view of supply chain efficiency. Include interactive features such as filters and drill-down capabilities to allow users to explore the data in more detail.

4. Actionable Insights:

- Use the visualizations to identify bottlenecks, optimize inventory management, and improve supply chain efficiency. Generate actionable insights and recommendations based on the analysis to drive strategic decision-making and operational improvements.

5. Iteration and Optimization:

- Continuously monitor and analyze supply chain data to identify emerging trends, patterns, and opportunities for optimization. Iterate on your visualizations and analysis as needed to adapt to changing business conditions and improve supply chain performance over time.

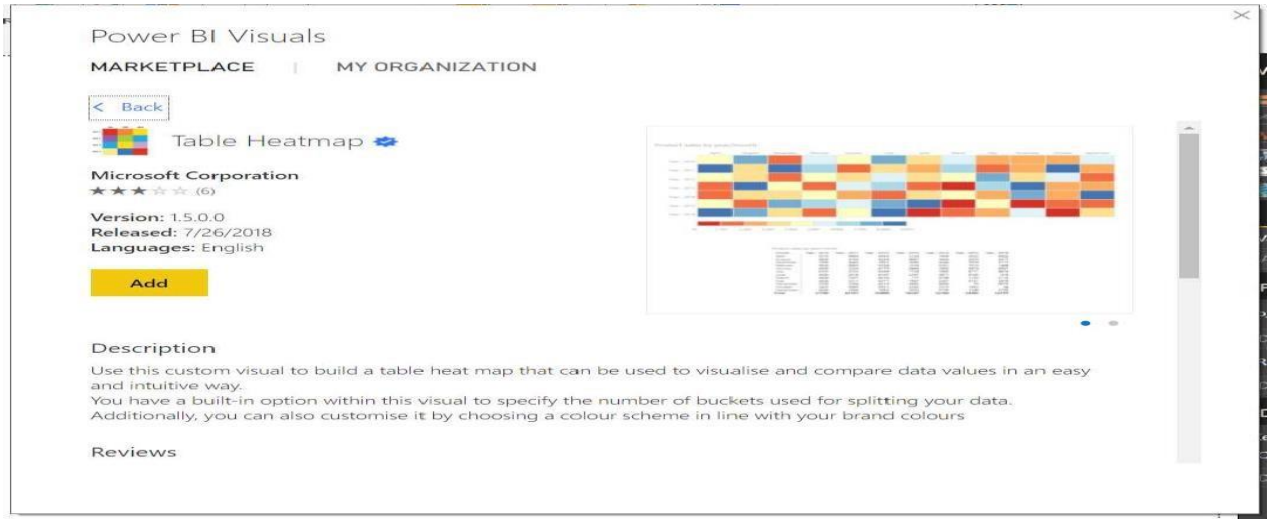

Fig: GTY 20

Experiment 20: Analyze health care data, such as patient demographics, medical diagnoses and treatment outcomes, to identify patterns and insights that can improve patient care and operational efficiency. Create visualizations to track patient wait times, appointment scheduling and resource utilization in health care facilities.

Analyzing healthcare data to improve patient care and operational efficiency involves understanding patient demographics, medical diagnoses, treatment outcomes, and operational metrics such as patient wait times, appointment scheduling, and resource utilization. Below are steps to create visualizations using Power BI to track these metrics:

1. Data Collection and Preparation:

- Gather healthcare data from sources such as Electronic Health Records (EHR), appointment scheduling systems, and operational databases.

- Clean and preprocess the data, ensuring accuracy and consistency. Merge datasets if necessary to create a comprehensive dataset for analysis.

2. Define Key Metrics:

- Identify key metrics related to patient care and operational efficiency, such as:

  - Patient wait times

  - Appointment scheduling efficiency

  - Resource utilization (e.g., staff, equipment)

  - Patient demographics

  - Medical diagnoses and treatment outcomes

3. Create Visualizations:

a. Patient Wait Times:

- Create a line chart or bar chart to track patient wait times over time.

- Use a heat map to visualize wait times by day of the week and time of day.

- Include filters to drill down into wait times by department, physician, or appointment type.

b. Appointment Scheduling:

- Use a Gantt chart or timeline visualization to visualize appointment scheduling and availability.

- Track appointment scheduling efficiency metrics such as appointment lead time and cancellation rates.

- Include a calendar view to show appointment availability and utilization.

c. Resource Utilization:

- Create stacked bar charts or area charts to visualize resource utilization by department or facility.

- Track metrics such as staff utilization rates, equipment usage, and room occupancy.

- Use tooltips or drill-through functionality to provide detailed information on resource utilization metrics.

d. Patient Demographics and Diagnoses:

- Create demographic breakdowns using pie charts, bar charts, or treemaps to visualize patient demographics (e.g., age, gender, location).

- Use a bubble chart or scatter plot to analyze medical diagnoses and treatment outcomes, with bubble size representing the number of cases and color representing treatment success rates.

4. Interactive Dashboard:

- Combine all visualizations into an interactive dashboard to provide a comprehensive view of patient care and operational efficiency.

- Include slicers, filters, and dropdowns to allow users to customize the dashboard based on their specific needs.

- Add drill-through functionality to allow users to explore data at different levels of detail.

5. Analysis and Insights:

- Analyze the visualizations to identify patterns, trends, and insights that can improve patient care and operational efficiency.

- Use the insights to make data-driven decisions and implement targeted interventions to address areas of improvement.


Patients Feedback
28%
72%
Male
Female
Patient Count by Department
Department
Patients Count
Cardiology
4,243
Dermatology
1,511
Waiting Tim
30.5
29.5
29
28.5
Ophthalmology
Dermatology
Cardiology
Orthope
Patients Satisfaction
15.6%
8%
9.2%
67.2%
Excellent
Average
Poor
Good
Patient Feedback Details
Name
Department
Feedback
Eric
Cardiology
Excellent
Eric
Dermatology
Average
Average Visit Length by Departme
Consulting Time
50
40
30
20
10
0
Ophthalmology
Dermatology
Cardiology
Orthope

Fig: GTY 21

MASTER OF BUSINESS ADMINSTARTION (MBA) SEMESTER-IV
BUSINESS INTELLIGENCE PRACTICAL LAB QUESTION BANK

SET 1

1. What is ETL process in Power BI? Explain with example?
2. What is Data visualization and explain various tools for visualization of Data?
3. Create a Histogram for the given sales force data
4. Create a data model in Power BI with an example of 10 years sales and profit information of XYZ company.
5. What is Dashboard? Create a dash board using Excel data?
6. Explain the concept of creating a new column in Power BI desktop with example?
7. How to create a Pivot table in Power BI?
8. Create a simple table in Power BI desktop and visualize the data with the help of Pie chart?
9. Explain the steps to Create a Business report using Power BI with Example
10. What is Power Query and how it is useful for analyzing the data in Power BI?
11. Explain the steps involved in connecting and preparing data for visualization in Tableau?
12. Briefly explain various data aggregation and statistical functions used in Tableau?
13. What are the different visualization operations performed on data in Tableau.
14. What is meant by KPI? How the stakeholders of a company need KPI's to understand the business at glance? (Example)
15. Create a visually appealing and informative report that summarizes key findings from your data analysis. Include relevant charts, tables, and titles using Tableau.
16. Create a bar chart to visualize total sales by product category. Explore sorting options to highlight top-selling categories using Tableau.
17. Explain how you would tailor your dashboard for different audiences (e.g., management vs. sales team) to emphasize relevant insights for each group using Tableau.
18. Create a scatter plot to analyze the relationship between sales amount and product price. Consider adding a trend line to identify any correlations.

19. Get a data set containing supply chain data, including inventory levels, lead times, and supplier performance metrics from web source and design visualizations to identify bottlenecks, optimize inventory management, and improve supply chain efficiency. Use tools like heat maps.

20. Analyze healthcare data, such as patient demographics, medical diagnoses, and treatment outcomes, to identify patterns and insights that can improve patient care and operational efficiency. Create visualizations to track patient wait times, appointment scheduling, and resource utilization in healthcare facilities.

SET 2

1) Explain and show the various filers available in Power BI
2) How do you get data in Power BI?
3) What are the various connectivity modes available in Power BI
4) Show the refresh option and various types of refresh options provided in Power BI
5) dataset containing sales data for a retail store, create a report with the following elements:
    - A template showing total sales revenue.
    - A bar chart showing total sales by product category.
    - A line chart displaying total sales trend over time.

6) Name three types of visualizations available in Power BI and explain when each is appropriate
7) create a date in calendar table in Power BI
8) Explain the different connectivity modes available in Power BI
9) Explain the various sources Power BI can connect to
10) Explain different views available in Power BI Desktop
11) How do you use building blocks of Microsoft Power BI.
12) Explain critical components of the Power BI toolkit and spot the same in query
13) Name some commonly used tasks in the Query Editor.
14) Explain the Schedule Refresh feature designed to work
15) How do you depict a story in Power BI

SET 3

1. What is Power BI?

Power BI is a collection of Business Intelligence tools, techniques, and processes that are used to extract valuable information from the raw business data by connecting, transforming, and visualizing raw data sets from multiple sources.

It provides the right tools to create interactive dashboards and live reports that can be shared and published on various platforms to help business users and stakeholders make better decisions. With the competitive and highly categorized information, planners and decision-makers can track their performance in the market.

2. How do you import data into Power BI?

Data can be imported into Power BI from various sources such as Excel files, databases, online services like Salesforce, and more. You can import data using the "Get Data" option in the Home tab.

3. How does Power BI differ from Excel?

Power BI is a business analytics tool by Microsoft, whereas Excel is a spreadsheet program. Power BI is more focused on data visualization and analysis, with capabilities for creating interactive reports and dashboards, whereas Excel is a general-purpose spreadsheet tool.

4. Why should we use Power BI?

Power BI provides an easy way for anyone, including non-technical people, to connect, change, and visualize their raw business data from many different sources and turn it into valuable data that makes it easy to make smart business decisions.

5. Difference between Power BI and Tableau

Power BI	Tableau
Power BI can handle a limited volume of datasets.	Can handle huge datasets without affecting the performance of the system.
Can be used by both naive and experienced users.	Used by experienced professionals for data analytics purposes.
Power BI has an easy-to-learn interface that helps the user to visualize the data and create reports.	The interface is difficult to understand by a non-technical user.
Provides an easy way for embedding the reports.	It’s a real-time challenge for embedding reports in Tableau.
Power BI uses Data Analysis Expression(DAX) to build formulas and expressions for measuring the columns.	Tableau uses Multidimensional Expressions(MDX) to create complex calculations and measure columns and dimensions.

6. What is business intelligence and why is it important?

Business intelligence (BI) refers to the use of technology, applications, and practices for the collection, integration, analysis, and presentation of business information. It helps organizations make data-driven decisions, identify trends, optimize processes, and gain a competitive edge in the market. BI is important because it enables businesses to turn raw data into actionable insights, leading to better strategic planning and improved performance.

7. What is data visualization and why is it important in BI?

Data visualization is the graphical representation of data and information. It's important in BI because it allows users to easily interpret and understand complex datasets, trends, and patterns. By presenting data visually through charts, graphs, and dashboards, BI systems enable stakeholders to make informed decisions quickly and effectively. Data visualization enhances communication, facilitates analysis, and improves decision-making across all levels of an organization.

8. What are the different types of visualizations available in Power BI?

Power BI offers various types of visualizations including bar charts, line charts, pie charts, maps, tables, matrices, and more. These visualizations help users represent data in a meaningful way.

9. What are the major components of Power BI?

There are five different components of Power BI.

Power Pivot: Fetches and cleans data and loads on to Power Query

Power Query: Operates on the loaded data

Power Q&A: Makes it possible for users to interact with reports using simple English language

Power View: Lets users create interactive charts, graphs, maps, and other visuals

Power Map: Enables the processing of accurate geographic locations in datasets

10. What is Power BI Q&A?

Ans: Power BI Q&A is a natural language tool that helps in querying your data and getting the results you need from it. You do this by typing into a dialog box on your Dashboard, which the engine instantaneously generates an answer similar to Power View. Q&A interprets your questions and shows you a restated query of what it is looking from your data. Q&A was developed by Server and Tools, Microsoft Research, and the Bing teams to give you a complete feeling of truly exploringyour data.

11. What is Power Pivot?

Power Pivot is an add-on provided by Microsoft for Excel since 2010. Power Pivot was designed to extend the analytical capabilities and services of Microsoft Excel.

12. What is Power Query in Power BI?

Power Query is a data transformation tool integrated into Power BI Desktop. It allows users to connect to various data sources, transform and clean the data, and then load it into the Power BI data model.

13. What is DAX?

DAX stands for Data Analysis Expressions. It's a collection of functions, operators, and constants used in formulas to calculate and return values. In other words, it helps you create new info from data you already have.

14. What is Power View?

Ans: Power View is a data visualization technology that lets you create interactive charts, graphs, maps, and other visuals which bring your data to life. Power View is available in Excel, SharePoint, SQL Server, and Power BI.

15. What is Power Map?

Ans: Power Map is an Excel add-in that provides you with a powerful set of tools to help you visualize and gain insight into large sets of data that have a geo-coded component. It can help you produce 3D visualizations by plotting upto a million data points in the form of column, heat, and bubble maps on top of a Bing map. If the data is time stamped, it can also produce interactive views that display, how the data changes over space and time.

16. What is a dashboard in Power BI?

A dashboard is a single-layer presentation sheet of multiple visualizations reports. The main features of the Power BI dashboard are: It allows you to drill through the page, bookmarks, and selection pane and also lets you create various tiles and integrate URLs. A dashboard can also help you set report layout to mobile view.

17. How can you create calculated columns in Power BI?

Calculated columns can be created in Power BI using the "New Column" option in the modeling tab. You can write DAX (Data Analysis Expressions) formulas to define calculated columns based on existing data.

18. Explain how relationships are defined in Power BI Desktop.

Relationships between tables are defined in two ways:

Manually - Relationships between tables are manually defined using primary and foreign keys.

Automatic - When enabled, this automated feature of Power BI detects relationships between tables and creates them automatically.

19. How can we filter data in Power BI?

Data can be filtered using various filters that are available in Power BI, implicitly. There are basically three types of filters, namely, Page-level filters, Drillthrough filters, and Report-level filters.

Drillthrough filters: With Drillthrough filters in Power BI Desktop, users can create a page in their reports that focuses on specific entities such as suppliers, customers, or manufacturers.

Page-level filters: These are used to filter charts that are present on individual pages.

Report-level filters: They are used to simultaneously filter charts that are present on all pages of a report.

20. What is a slicer in Power BI?

Answer: A slicer is a visual filter in Power BI that allows users to interactively filter data within a report or dashboard. It provides a user-friendly way to filter data by selecting specific values or ranges from a list.

SET 4

What is Tableau?

Tableau is a fast growing and powerful data visualization tool. Tableau is a business intelligence tool which helps us to analyze the raw data in the form of the visual manner; it may be a graph, report, etc.

Example: - If you have any data like **Big Data, Hadoop, SQL,** or any cloud data and if you want to analyze that given data in the form of pictorial representation of data, you can use Tableau.

Data analysis is very fast with Tableau, and the visualizations created are in the form of worksheets and dashboards. Any professional can understand the data created using Tableau.

Tableau software doesn't require any technical or any programming skills to operate. Tableau is easy and fast for creating visual dashboards.

Tools of Tableau

A list of Tableau tools:

- Tableau Desktop
- Tableau Public
- Tableau Online
- Tableau Server
- Tableau Reader

Download and Installation of Tableau

Tableau is available in two ways:-

- Tableau Public (Free)
- Tableau Desktop (Commercial)

Here is a comparison between the Tableau Public and Tableau Desktop

Tableau Public

- Tableau Public is a free and open-source.
- Tableau public data source can connect to Excel and Text files.
- Tableau public can be installed on Window and Mac operating system.
- Data and Visualizations are not secured in the Tableau public because it is available in public.

- In Tableau public, data cannot be obtained from different data sources as it is limited to connect only Excel and Text files.
- Tableau public uses the details at Personal level.

Tableau Desktop

- Tableau Desktop is a paid source, personal edition- $35 per month and professional edition- $70 per month.
- Tableau desktop data source can connect to any data source file, including databases, web applications, and more.
- Tableau desktop can also install on Window and Mac operating system.
- Data and Visualization are secured in Tableau desktop.
- In Tableau desktop, data can extract from various data sources and stored as Tableau extract file.
- Tableau desktop uses the details at Professional and Enterprise level.

Lets install the Tableau Desktop on Window machine and go through step by step:-

Go to https://www.tableau.com/products/desktop on your Web browser

Parameters	**Tableau**	**Power BI**
Meaning	Tableau is the data analytics and business intelligence tool for generating reports and data visualization tool with high flexibility.	Power BI is the business analytics tool to analyze the business and derive insight from it.
Year	Tableau was established in 2003.	Power BI was established in 2013.
Cost	Tableau is more expensive when itcomes to large enterprise, and it paid more when connected to third party application.	Power BI is less expensive when compared to the Tableau.
Data visualization	Tableau is a more preferred tool when it comes to data visualization.	Power BI focused on predictive modeling and reporting.
Data source	Tableau has access to many database sources and servers. **Ex:** Text file, Excel, JSON file, Access, PDF file, Statistical file, Spatial file, etc.	Power BI has limited access to other database and servers. **Ex:** Access database, SQL server database, SQL server analysis services database, IBM DB2 database, Oracle

		database, etc.
Deployment	Tableau have more flexible deployment. It available on-premises and cloud both model options.	Power BI is available as SaaS model options only.
User interface	Tableau has a slick user interface that enables the user to create a customized dashboard.	Power BI has a more understandable interface and much simpler to learn. Due to its simplicity and easy to use, that's why business users prefer power BI.
Data capacity	Tableau works on the columnar based structure that stores unique values for each column, making it possible to fetch millions of rows.	Power BI can Handel up to 10 GB of data. For more than 10 GB, data should be in the cloud (Azure). If it is in the local database, then Power BI selects the data from the database but does not import.
Machine learning	Python machine learning capacities is in build with a Tableau that makes it efficient for performing machine learning operation over the datasets.	Power BI is integrated with Microsoft Azure that helps in analyzing the data and understanding the pattern of the business.
Performance	Tableau can handle huge data with better performance.	Power BI can handle limited data only.
Users	Tableau required analysts users for their analytics purpose.	Power BI required both technical and non-technical users.
Infrastructure	Tableau provides flexible infrastructure.	Power BI provides software as a service infrastructure.
Overall functionality	Tableau has excellent functionality.	Power BI has good functionality.
Support level	Tableau has a high support level in comparison to power BI.	Power BI has a low support level.
Programming tools support	Tableau integrates much better with R language as compared to power BI.	Power BI is also connected to the R language using Microsoft revaluation analytics. But it is only available for enterprises level users.

Lab Experiment:01

Introduction to Business Intelligence Tools - Tableau and Power BI

Objective:

To familiarize with and compare the functionalities of Tableau and Power BI for data visualization and analysis.

Requirements:

- Computers with Tableau and Power BI installed.
- Sample datasets for testing.
- Access to online resources for assistance.

Experiment Steps:

1. **Data Import:**
   - Import the provided dataset into both Tableau and Power BI.
   - Ensure the data is imported correctly and preview the dataset.
2. **Data Exploration:**
   - Explore the dataset in both Tableau and Power BI.
   - Identify key attributes and understand the data structure.
   - Utilize filtering, sorting, and grouping functions to gain insights.
3. **Visualization Creation:**
   - Create basic visualizations (bar chart, line graph, pie chart, etc.) in Tableau using the dataset.
   - Repeat the same process in Power BI.
   - Compare the ease of creating and customizing visualizations in both tools.
4. **Interactive Dashboards:**
   - Build an interactive dashboard in Tableau with the visualizations created.
   - Repeat the process in Power BI.
   - Evaluate the interactivity and user experience of the dashboards in both tools.
5. **Advanced Analysis:**
   - Perform advanced analysis tasks such as forecasting or trend analysis in Tableau.
   - Repeat the same tasks in Power BI.
   - Compare the capabilities and performance of each tool for advanced analysis.
6. **Sharing and Collaboration:**
   - Explore the sharing and collaboration features of Tableau and Power BI.
   - Share the created dashboards with peers or colleagues.
   - Gather feedback on usability and accessibility from others.
7. **Documentation and Analysis:**
   - Document your findings, including observations, comparisons, strengths, and weaknesses of both Tableau and Power BI.

- Analyze which tool better meets your requirements based on the experiment outcomes.

Solution:

1. **Data Import:**
   - Use the import data feature in Tableau and Power BI to load the dataset.
   - Ensure the dataset is properly imported, and preview the data to confirm accuracy.
2. **Data Exploration:**
   - Explore the dataset using Tableau's data pane and Power BI's data view.
   - Identify key attributes, such as numerical and categorical variables.
   - Utilize filtering and sorting options to analyze data subsets.
3. **Visualization Creation:**
   - Create a bar chart depicting sales performance in Tableau by dragging the "Sales" measure to the Columns shelf and "Product Category" dimension to the Rows shelf.
   - Repeat the same process in Power BI by selecting the "Sales" measure and "Product Category" dimension for visualization.
4. **Interactive Dashboards:**
   - Build an interactive dashboard in Tableau by combining the created bar chart with a line graph showing sales trends over time.
   - Repeat the process in Power BI by adding the bar chart and line graph to a single dashboard.
5. **Advanced Analysis:**
   - Perform forecasting in Tableau by applying the built-in forecasting feature to the sales trend line graph.
   - Repeat the forecasting task in Power BI using its forecasting capabilities.
6. **Sharing and Collaboration:**
   - Share the Tableau dashboard with colleagues by publishing it to Tableau Server or Tableau Online.
   - Share the Power BI dashboard by publishing it to Power BI Service and granting access to collaborators.
7. **Documentation and Analysis:**
   - Document observations regarding the ease of use, feature availability, performance, and collaboration capabilities of both Tableau and Power BI.
   - Analyze which tool better meets the requirements based on the experiment outcomes and provide recommendations.

OUTCOME:

This experiment should provide a comprehensive introduction to Tableau and Power BI, enabling participants to understand their functionalities and make informed decisions regarding their suitability for business intelligence purposes.

What is the Purpose of a Dashboard?

A car dashboard provides real-time information about a car's speed, fuel volume, RPM, and other engine-related indicators. Similarly, a data dashboard provides information about company historical sales, key performance indicators (KPIs), sales growth, operational indicators, and customer feedback. This information is presented in a precise manner so that managers or executives can understand the situation and make appropriate decisions.

There are hundreds of moving parts in your business and a dashboard summarizes these events into an easy-to-understand, real-time data visualization. These visualizations and charts can be used to make fast and effective decisions.

There are several benefits of dashboard reporting:

- Usability: a typical company generates gigabytes of raw data daily. Understanding the data can help companies create value from it and make better decisions. Dashboards provide access to all key metrics on a single screen, turning raw data into valuable insights.
- Access to data: a single dashboard has access to multiple data sources to provide detailed reports of the inner workings of a company.
- Decision making: managers or executives can view anomalies, forecast sales, and review historical data to come up with business strategies. The information is available in an interactive visual form, where we can dive deep into historical data or filter out critical parameters.
- Accountability: it provides an unbiased picture of how well your company is performing. The dashboard can show you the difference in growth percentage and how you may have failed at a certain marketing campaign. Accountability is necessary to keep companies away from bankruptcy.
- Interactivity: the gamified and dynamic experience of the dashboard makes it easy to use and understand various factors of organizations. You can filter, isolate a single metric, zoom into a map or time series line plot, search for terms or even use third-party tools to generate anomaly alarms.

- Analysis: you can use these dashboards to come up with detailed analytical reports. The dashboard simplifies data analysis tasks as you are monitoring key permanence metrics and making sense of past events.

What are the Types of Dashboards?

There are several ways to customize the dashboard, and they all fall into one of three categories - **iDashboards**:

1. Operational Dashboards: these dashboards show the real-time performance of day-to-day business operations. They are connected to multiple data sources and contain hundreds of metrics, indicating various functionalities of the business.
2. Analytical Dashboards: these dashboards use historical data to identify trends. They are mainly used by data analysts to write detailed reports about a company's past performance and what steps they can use to improve current systems.
3. Strategic Dashboards: these dashboards are mainly used to track current performance compared to key performance indicators and align actions with strategy.

Lab Experiment:02

Creating Interactive Dashboards and Reports

Objective:

To learn and practice creating interactive dashboards and reports using Tableau.

Requirements:

- Computer with Tableau Desktop installed.
- Sample dataset for experimentation.
- Access to online resources for assistance.

Experiment Steps:

1. **Data Import:**

- Import the provided dataset into Tableau.
- Ensure the data is properly structured and loaded into Tableau.

2. **Data Exploration:**
   - Explore the dataset using Tableau's data pane and preview functionality.
   - Identify key attributes and understand the data's structure and distribution.
3. **Visualization Creation:**
   - Create individual visualizations (e.g., bar charts, line graphs, pie charts) to represent different aspects of the dataset.
   - Customize each visualization by adjusting colors, labels, and other formatting options.
4. **Dashboard Creation:**
   - Combine multiple visualizations into a dashboard layout.
   - Arrange the visualizations to create a logical flow of information.
   - Add dashboard objects such as text boxes, images, or web objects to enhance the dashboard's presentation.
5. **Interactivity:**
   - Implement interactivity features such as filters, parameters, and actions to make the dashboard interactive.
   - Test the interactivity by interacting with the dashboard elements and observing the changes in the visualizations.
6. **Formatting and Styling:**
   - Apply formatting and styling options to the dashboard to improve its visual appeal and readability.
   - Use themes, backgrounds, and borders to enhance the overall design.
7. **Testing and Validation:**
   - Test the dashboard's functionality across different devices and screen sizes to ensure responsiveness.
   - Validate the accuracy of the data and the effectiveness of the visualizations in conveying insights.
8. **Documentation and Analysis:**
   - Document the steps taken to create the interactive dashboard.
   - Analyze the effectiveness of the dashboard in conveying insights and facilitating data-driven decision-making.
   - Reflect on the challenges encountered and lessons learned during the dashboard creation process.

Solution:

1. **Data Import:**
   - Open Tableau Desktop and connect to the provided dataset (e.g., CSV file, Excel spreadsheet).
   - Navigate to the "Data Source" tab and confirm that the dataset fields are correctly identified.
2. **Data Exploration:**
   - Review the dataset by examining the fields and data types in the Data Source tab.

- Drag individual fields onto the canvas to create initial visualizations and understand the data's distribution.

3. **Visualization Creation:**

- Create various visualizations such as bar charts, line graphs, and scatter plots by dragging fields onto the Rows and Columns shelves.
- Customize each visualization by adjusting colors, labels, and other formatting options in the "Marks" card.

4. **Dashboard Creation:**

- Click on the "New Dashboard" button to create a blank dashboard.
- Drag the desired visualizations onto the dashboard canvas and arrange them to create a cohesive layout.

5. **Interactivity:**

- Add interactivity to the dashboard by creating filters, parameters, and actions.
- For example, create a filter to allow users to select specific time periods or regions to dynamically update the visualizations.

6. **Formatting and Styling:**

- Apply formatting options such as font styles, background colors, and borders to enhance the dashboard's appearance.
- Use Tableau's built-in themes or create custom styles to maintain consistency across the dashboard.

7. **Testing and Validation:**

- Test the dashboard's responsiveness by resizing the Tableau window or viewing it on different devices.
- Verify the accuracy of the data by cross-referencing the visualizations with the original dataset.

8. **Documentation and Analysis:**

- Document the steps followed to create the interactive dashboard, including any challenges encountered and solutions implemented.
- Analyze the effectiveness of the dashboard in conveying insights and facilitating data-driven decision-making.
- Reflect on the lessons learned and identify areas for improvement in future dashboard projects.

Lab Experiment: 03

Data Storytelling and Communicating Insights Effectively

Objective:

To learn and practice the art of data storytelling and effectively communicating insights using data visualization.

Requirements:

- Computer with data visualization software (e.g., Tableau, Power BI, Python libraries) installed.
- Sample dataset for experimentation.
- Access to online resources for assistance.

Experiment Steps:

1. **Data Exploration:**
   - Begin by exploring the dataset to understand its structure, variables, and relationships.
   - Identify key insights or trends that can be potentially interesting for storytelling.
2. **Identify the Story:**
   - Determine the overarching narrative or story you want to convey with the data.
   - Consider the target audience and what insights would be most relevant and impactful for them.
3. **Visualize the Data:**
   - Create visualizations that support the narrative and key insights identified.
   - Use appropriate chart types, colors, and annotations to enhance clarity and understanding.
4. **Craft the Story:**
   - Structure the narrative around the key insights, using visualizations to support each point.
   - Incorporate context, background information, and real-world examples to make the story relatable and engaging.
5. **Design the Presentation:**
   - Design a presentation or report format to communicate the data story effectively.
   - Consider the layout, flow, and visual design elements to ensure clarity and coherence.
6. **Practice Delivery:**
   - Practice presenting the data story, focusing on clear communication and engaging delivery.
   - Use storytelling techniques such as pacing, suspense, and emotion to captivate the audience.
7. **Solicit Feedback:**
   - Present the data story to peers or colleagues and solicit feedback on clarity, engagement, and effectiveness.
   - Use feedback to refine and improve the storytelling approach.
8. **Reflect and Iterate:**
   - Reflect on the feedback received and the overall effectiveness of the data storytelling.
   - Identify areas for improvement and iterate on the storytelling approach for future presentations.

Solution:

1. **Data Exploration:**
   - Explore the provided dataset, which includes sales data for a retail company, including product categories, sales amounts, and customer demographics.
2. **Identify the Story:**
   - Determine that the story will focus on analyzing sales performance by product category and identifying key factors driving sales.
3. **Visualize the Data:**
   - Create visualizations such as bar charts and line graphs to represent sales performance by product category over time.
   - Use additional visualizations such as pie charts and scatter plots to analyze relationships between sales and other variables such as customer demographics.
4. **Craft the Story:**
   - Structure the narrative around the key findings, highlighting trends, patterns, and outliers in the data.
   - Incorporate insights into factors influencing sales, such as marketing campaigns, seasonality, and customer preferences.
5. **Design the Presentation:**
   - Design a slide deck presentation with a clear agenda, introduction, main body, and conclusion.
   - Use visual design elements such as color, typography, and imagery to enhance the presentation's visual appeal.
6. **Practice Delivery:**
   - Practice delivering the presentation, focusing on clear articulation, pacing, and engagement.
   - Use storytelling techniques such as anecdotes, examples, and visual cues to enhance audience engagement.
7. **Solicit Feedback:**
   - Present the data story to a small group of colleagues and solicit feedback on clarity, engagement, and effectiveness.
   - Receive feedback on the clarity of the narrative, the relevance of the insights, and the effectiveness of the visualizations.
8. **Reflect and Iterate:**
   - Reflect on the feedback received and make adjustments to the storytelling approach, visualizations, or presentation format as needed.
   - Iterate on the presentation to improve clarity, engagement, and overall effectiveness for future presentations.

Lab Experiment: 04

Developing a Comprehensive Business Analysis Solution

Objective:

To apply business analysis techniques to address a real-world business problem and develop a comprehensive solution.

Requirements:

- Computer with tools for data analysis, modeling, and documentation (e.g., Excel, business process modeling software).
- Access to the business problem statement and relevant data sources.
- Access to stakeholders or subject matter experts for consultation.

Experiment Steps:

1. **Problem Identification:**
   - Review the provided business problem statement and clarify any ambiguities with stakeholders or subject matter experts.
   - Clearly define the problem scope, objectives, and constraints.
2. **Stakeholder Analysis:**
   - Identify and analyze stakeholders involved in or affected by the problem.
   - Determine their needs, expectations, and influence on the project.
3. **Business Process Analysis:**
   - Map out the current business processes related to the problem using process modeling techniques (e.g., BPMN).
   - Identify inefficiencies, bottlenecks, and areas for improvement in the existing processes.
4. **Requirements Gathering:**
   - Conduct interviews, surveys, or workshops with stakeholders to gather requirements for the solution.
   - Document functional and non-functional requirements, prioritizing them based on importance and feasibility.
5. **Data Analysis:**
   - Analyze relevant data sources to gain insights into the problem and potential solutions.
   - Use data visualization and statistical analysis techniques to identify trends, correlations, and patterns.
6. **Solution Design:**
   - Develop a solution design that addresses the identified requirements and aligns with the business goals.
   - Consider alternative solutions and evaluate their feasibility, risks, and benefits.

7. **Prototyping and Validation:**
   - Create prototypes or mockups of the proposed solution to validate its functionality and usability.
   - Gather feedback from stakeholders and iterate on the design based on their input.
8. **Documentation:**
   - Document the entire BA process, including problem analysis, stakeholder analysis, requirements, solution design, and validation results.
   - Ensure that the documentation is clear, concise, and organized for easy reference.

Solution:

1. **Problem Identification:**
   - Review the problem statement provided by the client, which involves optimizing the inventory management process for a retail business to reduce costs and improve efficiency.
2. **Stakeholder Analysis:**
   - Identify stakeholders including retail managers, warehouse staff, procurement team, and IT department.
   - Analyze their needs, with retail managers prioritizing inventory accuracy, warehouse staff focusing on operational efficiency, and procurement team emphasizing cost reduction.
3. **Business Process Analysis:**
   - Map out the current inventory management process, from procurement to sales, using BPMN diagrams.
   - Identify bottlenecks such as manual data entry, lack of real-time visibility, and overstocking.
4. **Requirements Gathering:**
   - Conduct interviews with stakeholders to gather requirements, including the need for real-time inventory tracking, automated reorder alerts, and integration with POS systems.
   - Prioritize requirements based on stakeholder feedback and business impact.
5. **Data Analysis:**
   - Analyze historical sales data and inventory records to identify trends, seasonality, and stock turnover rates.
   - Use data visualization tools to create charts and graphs illustrating inventory levels, sales trends, and stockouts.
6. **Solution Design:**
   - Develop a solution that includes implementing an Inventory Management System (IMS) with real-time tracking, barcode scanning, and automated reorder functionality.
   - Integrate the IMS with existing ERP and POS systems for seamless data exchange.
   - Design user-friendly interfaces for retail managers and warehouse staff to access inventory information and generate reports.
7. **Prototyping and Validation:**
   - Create prototypes of the IMS interfaces and workflow diagrams to validate the solution with stakeholders.
   - Conduct usability testing sessions to gather feedback on the prototypes and iterate on the design based on user input.

8. **Documentation:**

- Document the entire BA process, including problem analysis, stakeholder analysis, requirements documentation, solution design, and validation results.
- Provide detailed specifications and user manuals for the IMS implementation team.
- Maintain clear communication channels with stakeholders throughout the project lifecycle.

Example: Optimizing Inventory Management for a Retail Business
Problem Statement:

ABC Retail is experiencing challenges with inventory management, leading to stockouts, overstocking, and increased costs. The current manual inventory tracking system is inefficient and prone to errors. The retail managers lack real-time visibility into inventory levels and struggle to make data-driven decisions. The objective is to implement a solution that improves inventory accuracy, reduces costs, and enhances operational efficiency.

Outcome:

By implementing the proposed solution, ABC Retail successfully optimizes its inventory management processes. Retail managers gain real-time visibility into inventory levels, enabling them to make data-driven decisions and prevent stockouts. Automated reorder functionality reduces excess inventory and associated costs. The integration with existing systems streamlines operations and enhances overall efficiency, leading to improved customer satisfaction and profitability for ABC Retail