VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi - 590 018

Lab Report on

DATA VISUALIZATION LAB
Code: BAIL504

A dissertation lab report submitted in 5th semester in partial fulfillment of the requirement for the award of the degree

Bachelor of Engineering

in

Information Science & Engineering

Under the guidance of Lab Coordinator

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Submitted by

Name (USN:)

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

ADICHUNCHANAGIRI INSTITUTE OF TECHNOLOGY

(Affiliated to Visvesvaraya Technological University, Belagavi)

Chikkmagaluru,India – 577102

2024-2025

DATA VISUALIZATION LAB		Semester	V
Course Code	**BAIL504**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	100
Examination type (SEE)	Practical		

Course objectives:

- Understand the Importance of data Visualization for business intelligence and decision making.
- Learn different approaches to understand the importance of visual perception.
- Learn different data visualization techniques and tools.
- Gain knowledge of effective data visuals to solve workplace problems.

Sl.NO	Experiments
1	**Getting Started -** Tableau Workspace, Tableau terminologies, basic functionalities.
2	**Connecting to Data Source –** Connecting to Database, Different types of Tableau Joins.
3	**Creating a View -** formatting charts, adding filters, creating calculated fields and defining parameters.
4	**Dashboard Design and Storytelling –** Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.
5	**Introducing Power BI –**Components and the flow of work. Power BI Desktop Interface-The Report has five main areas.
6	**Querying Data from CSV -** Query Editor, Connecting the data from the Excel Source, Clean, Transform the data.
7	**Creating Reports & Visualizations -** Different types of charts, Formatting charts with Title, Colors.
8	**Dashboards -** Filters in Power BI, Formatting dashboards.
9	Analysis of revenue in sales dataset: i) Create a choropleth map (fill the map) to spot the special trends to show the state which has the highest revenue. ii) Create a line chart to show the revenue based on the month of the year. iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue. iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field. v) Create a butterfly chart by reversing the bar chart to compare female & male revenue based on product category. vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state. vii) Build a dashboard.
10	Analysis of GDP dataset: i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps. ii) Create a bar graph to compare GDP of Belgium between 2006 – 2026. iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010. iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.
	v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006. vi) Build an interactive dashboard.
11	Analysis of HR Dataset: i)Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age. ii) Create a Lollipop Chart to show the attrition rate based on gender category. iii) Create a pie chart to show the attrition percentage based on Department Category- Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label. iv) Create a bar chart to display the number of employees by Age group, v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count. vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition – drag education field to rows, sum attrition count to col, vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.
12	Analysis of Amazon Prime Dataset: i) Create a Donut chart to show the percentage of movie and tv shows ii) Create a area chart to shows by release year and type iii) Create a horizontal bar chart to show Top 10 genre iv) Create a map to display total shows by country v) Create a text sheet to show the description of any movie/movies. vi) Build an interactive Dashboard.

Rubrics

Experiment No	Date	Attendance 5 Marks	Inference 10 Marks	Report 5 Marks	Subject Knowledge 10 Marks	Total
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

	Max Marks	Marks Obtained
Daily Score	30	
IA Score	20	

Total Lab Score

50

TABLE OF CONTENT

Introduction to Various Data Visualization Tools

Data visualization is the practice of translating information into a visual context, such as a map or graph, to make data easier for the human brain to understand and pull insights from. It is the representation of information and data through use of common graphics, such as charts, plots, infographics, and animations. Data visualization is a powerful way for people, especially data professionals, to display data so that it can be interpreted easily.

Data Visualization enables decision-makers of any enterprise or industry to look into analytical reports and understand concepts that might otherwise be difficult to grasp.

Benefits of Data Visualization:

1. It is easy to understand the information with graphics
2. It made data to be represented in attractive way
3. Shows complex relationships
4. Helps to process large datasets
5. Useful for identifying trends
6. Minimizes ambiguity

Data visualization tools provide the ability to see and understand data trends, outliers, and patterns in an easy, intuitive way. There are various data visualization tools available. One must choose the tool based on various factors such as its ease of use, types of graphical representations the tool can produce, size of the dataset the tool can handle etc. some of Data Visualization tools are Tableau, Power BI, Google Charts, Jupyter, Grafana etc.

The following are some common types of data visualizations:

Table: A table is data displayed in rows and columns, which can be easily created in a Word document or Excel spreadsheet.

Chart or graph: Information is presented in tabular form with data displayed along an x and y axis, usually with bars, points, or lines, to represent data in comparison.

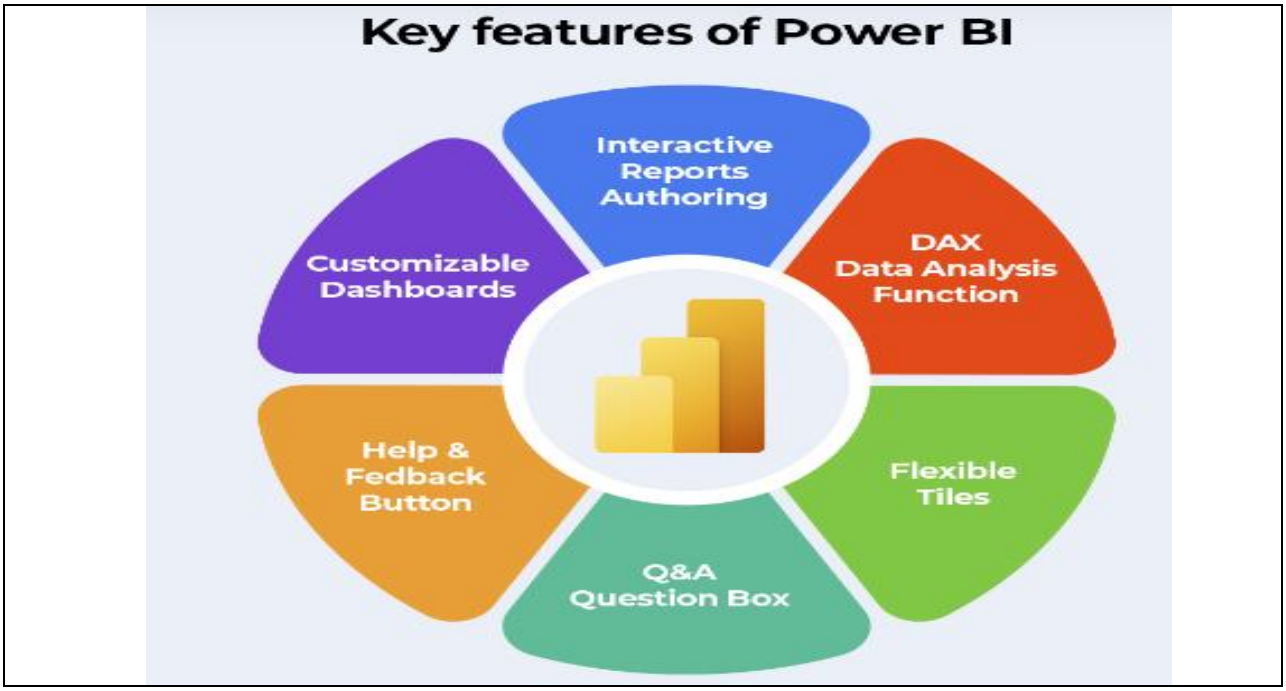
Geospatial visualization: Data is depicted in map form with shapes and colors that illustrate the relationship between specific locations, such as a choropleth or heat map.

Dashboard: Data and visualizations are displayed, usually for business purposes, to help analysts understand and present data.

POWER BI

Power BI is a business intelligence tool that allows you to connect to various data sources, visualize the data in reports and dashboards, and then share them with anyone you want.

Power BI is a Data Visualization and Business Intelligence tool that converts data from different data sources to interactive dashboards and BI reports.



What is Power BI Used For

Power BI is a tool in the category of Business Intelligence (BI). The purpose of BI is to track Key Performance Indicators (KPIs) and uncover insights in business data so as to better inform decision-making across the organization.

Power BI is used in different ways depending on the role of the individual, from developers, analysts, managers, and directors, to everyone in between.

How Does Power BI Compare to Other Tools Like Tableau and Excel?Power BI and Tableau are both business intelligence tools and have a lot of overlap in terms of their capabilities. There are 2 key differences between Power BI and Tableau:

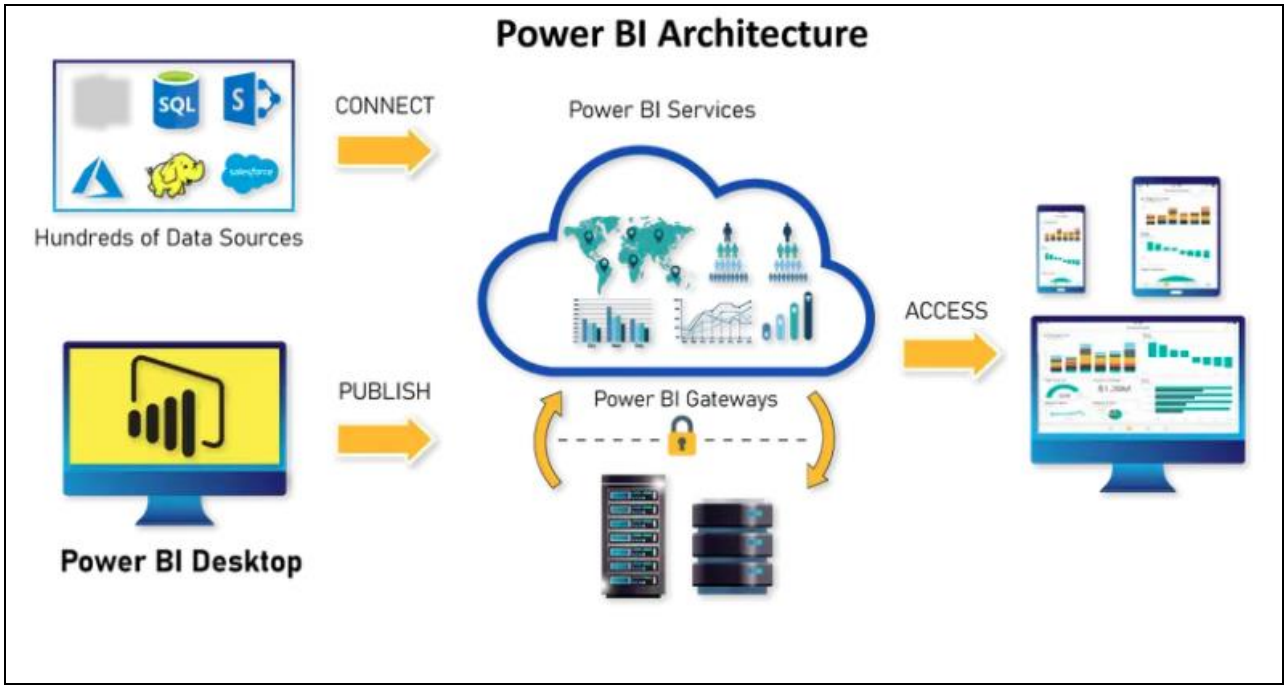
1. Power BI only works on Windows, whereas Tableau supports both Windows and MacOS.
2. Pricing options differ between Power BI and Tableau. However, Tableau is generally the more expensive option.

Why Power BI?

"DATA "-------Analysis and Decision Making

Organizations need a tool that can help them understand the large amount of data that they are collecting. It is a powerful data visualization and analysis tool that allows businesses to turn raw data into actionable insights and reports.

Microsoft Power BI comes with a free or paid version. The free version only provides Power BI tools like Power BI Desktop and Power Q&A to dashboards. Whereas, in the Pro version they provide services like live report sharing, Power View, and more Power BI apps.



Power BI includes the following components –

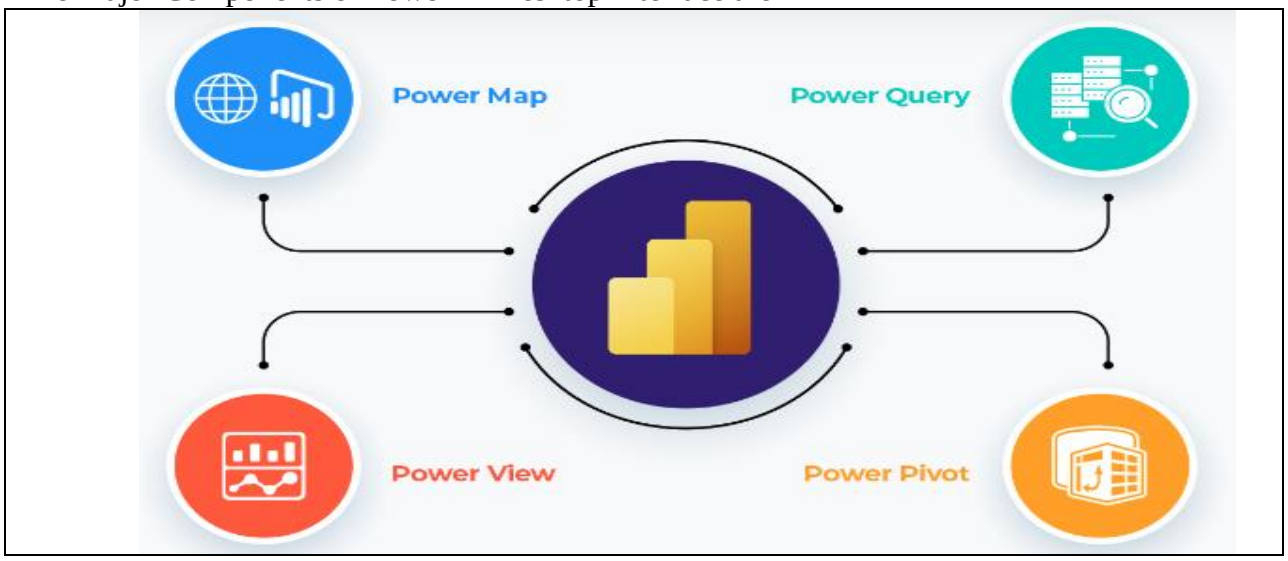
• **Power BI Desktop** − This is used to create reports and data visualizations on the dataset.

• **Power BI Gateway** − You can use Power BI on-premises gateway to keep your data fresh by connecting to your on-premises data sources without the need to move the data. It allows you to query large datasets and benefit from the existing investments.

• **Power BI Mobile Apps** − Using Power BI mobile apps, you can stay connected to their data from anywhere. Power BI apps are available for Windows, iOS, and Android platform.

• **Power BI Service** − This is a cloud service and is used to publish Power BI reports and data visualizations

The Major Components of Power BI Desktop Interface are



Power Query Editor

It is the process of cleansing and transforming data and permits users to access datasets connecting from multiple sources. It is included on the Power BI desktop. Business users may view the data from distinct databases like MySQL, SQL servers, DB2, and many more.

Power View

It is a data visualization tool that assists users in developing stunning charts, and colourful maps, that turn data into a story.

Power Map
It is a 3D map visualization tool to identify geospatial data on Map visuals. It helps organizations to examine the maximum sales production geographically, visualizing the demographic populations of specific regions.
Power Pivot
It is a Data Modelling technique that is used to create relationships between datasets. It performs complex computations by utilizing DAX functions.
Power Q & A
When dealing with giant datasets, it becomes crucial to get to know the in-depth details of the data. Luckily, it is done through natural language where users may ask questions and obtain the answer through Power Q & A.

Downloading and Installing Power BI Desktop from below link
https://www.microsoft.com/en-us/power-platform/products/power-bi/downloads

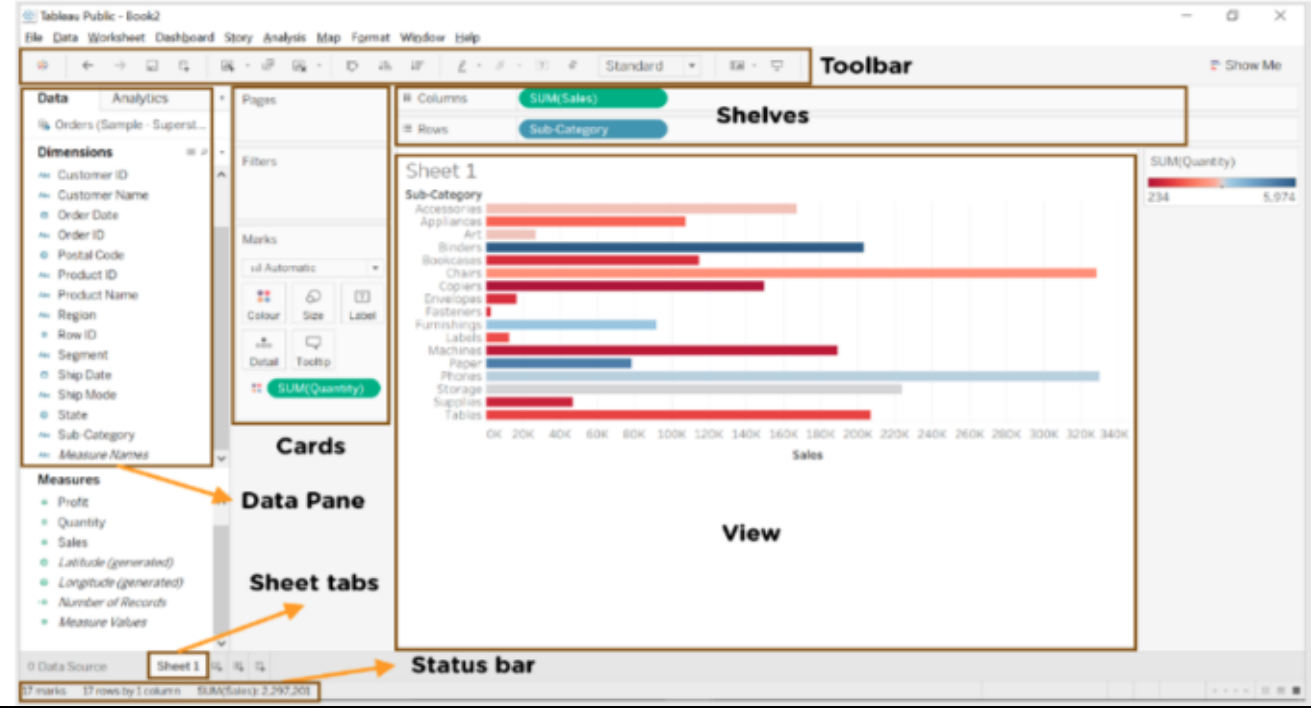
Tableau

Tableau is a data visualization tool that provides pictorial and graphical representations of data. It is used for data analytics and business intelligence. Tableau provides limitless data exploration without interrupting flow of analysis. With an intuitive drag and drop interface, user can uncover hidden insights in data and make smarter decisions faster.
Tableau is a Business Intelligence tool for visually analyzing the data. Users can create and distribute an interactive and shareable dashboard, which depict the trends, variations, and density of the data in the form of graphs and charts. Tableau can connect to files, relational and Big Data sources to acquire and process data. The software allows data blending and real-time collaboration, which makes it very unique. It is used by businesses, academic researchers, and many government organizations for visual data analysis. It is also positioned as a leader Business Intelligence and Analytics Platform in Gartner Magic Quadrant.
As a leading data visualization tool, Tableau has many desirable and unique features. Its powerful data discovery and exploration application allows you to answer important questions in seconds. You can use Tableau's drag and drop interface to visualize any data, explore different views, and even combine multiple databases easily. It does not require any complex scripting. Anyone who understands the business problems can address it with a visualization of the relevant data. After analysis, sharing with others is as easy as publishing to Tableau Server.

Tableau Features

• **Speed of Analysis** − As it does not require high level of programming expertise, any user with access to data can start using it to derive value from the data.
• **Self-Reliant** − Tableau does not need a complex software setup. The desktop version which is used by most users is easily installed and contains all the features needed to start and complete data analysis.
• **Visual Discovery** − The user explores and analyzes the data by using visual tools like colors, trend lines, charts, and graphs. There is very little script to be written as nearly everything is done by drag and drop.
• **Blend Diverse Data Sets** − Tableau allows you to blend different relational, semi structured and raw data sources in real time, without expensive up-front integration costs. The users don't need to know the details of how data is stored.
• **Architecture Agnostic** − Tableau works in all kinds of devices where data flows. Hence, the user need not worry about specific hardware or software requirements to use Tableau.
• **Real-Time Collaboration** − Tableau can filter, sort, and discuss data on the fly and embed a live dashboard in portals like SharePoint site or Salesforce. You can save your view of data and allow colleagues to subscribe to your interactive dashboards so they see the very latest data just by refreshing their web browser.
• **Centralized Data** − Tableau server provides a centralized location to manage all of the organization's published data sources. You can delete, change permissions, add tags, and manage schedules in one

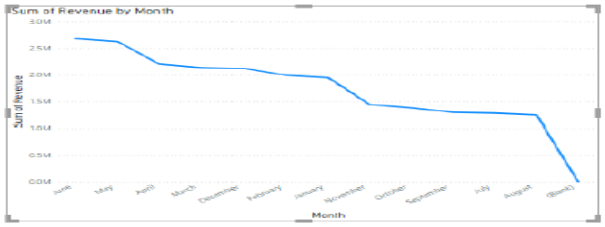
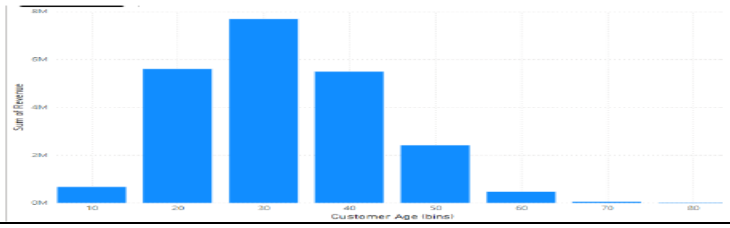
convenient location. It's easy to schedule extract refreshes and manage them in the data server. Administrators can centrally define a schedule for extracts on the server for both incremental and full refreshes.



Key Differences Between Power BI and Tableau

Power BI uses DAX for measuring and calculating columns.	Tableau deploys MDX for dimensions and measures.
Power BI is best for a limited volume of data.	Tableau can handle huge columns of data and still offer better performance.
Power BI offers many data points for data visualization.	Tableau has better data visualization.

Experiment 9: Analysis of Revenue in Sales Dataset

a)	Create a **line chart** to show the revenue based on the month of the year
	Steps to followed : **Select Line Chart** 1. Drag the **month** field to the "X-Axis" field 2. Drag the **Sum of revenue** field to the "Y-Axis" field.
	Line Chart 
b)	Create a **bin** of size 10 for the age measure to create a new dimension to show the revenue
	Steps to followed **Select Stacked Column Chart** 1. Drag the **Sum of revenue** field to the "Y-Axis" field. 2. Right-click on the age field and choose "New group". In the "Group" window, select "Bin" and set the bin size to 10. Drag the New **Customer Age (Bins)** field to the "X-Axis" field.
	
	Final Sales Dashboard