



SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

Siddharth Nagar, Narayanavanam Road-517583

Subject with Code: Data Visualization (23CS0918)

Year & Sem: III B.Tech. & II Sem

Course & Branch: CAD

Regulation: R23

UNIT I: Introduction to Data Visualization & Perception

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| 1 | a | Define data visualization and discuss its importance in modern data analysis. | [CO1, L2] | 5M |
| | b | Explain the scope of data visualization across multiple domains. | [CO1, L2] | 5M |
| 2 | a | Explain various data types used in data visualization with suitable examples. | [CO1, L2] | 5M |
| | b | What are the different sources of data for visualization? | [CO1, L1] | 5M |
| 3 | | Explain pre-attentive attributes with examples. | [CO1, L2] | 10M |
| 4 | | Explain Gestalt principles of perception with diagrams. | [CO1, L2] | 10M |
| 5 | | Define the concept of Data-Ink Ratio in data visualization. Discuss Edward Tufte's five Data-Ink Laws with suitable examples | [CO1, L3] | 10M |
| 6 | | Define Data Density in data visualization. Explain its different types with suitable examples. List out advantages and Disadvantages. | [CO1, L3] | 10M |
| 7 | | Describe the stages of the visualization process from raw data to insight. | [CO1, L2] | 10M |
| 8 | a | List and explain key visualization design principles. | [CO1, L1] | 5M |
| | b | Explain the Lie Factor in data visualization with one example. | [CO1, L2] | 5M |
| 9 | | List out various data visualization tools used in data analysis. Compare Tableau and Power BI. | [CO1, L2] | 10M |
| 10 | a | Define data visualization. | [CO1, L1] | 2M |
| | b | List two types of data used in visualizations. | [CO1, L1] | 2M |
| | c | What is a pre-attentive attribute? | [CO1, L1] | 2M |
| | d | State the purpose of the Data-Ink Ratio. | [CO1, L1] | 2M |
| | e | Name tools used for data visualization. | [CO1, L1] | 2M |

UNIT II: Visualization Techniques for Categorical & Quantitative Data

1	a	Discuss various types of bar charts with use cases.	[CO2, L2]	5M
	b	Write a short note on pie charts. Mention their applications, advantages, and disadvantages.	[CO2, L2]	5M
2	a	Explain the role of column charts in data comparison with diagram.	[CO2, L2]	5M
	b	Discuss various types of histogram plots with neat sketch.	[CO2, L2]	5M
3		Explain the construction of a boxplot and discuss its importance in spotting outliers.	[CO2, L3]	10M
4	a	Differentiate between line charts and bar charts with neat sketch.	[CO2, L4]	5M
	b	Write a short note on scatter plots.	[CO2, L2]	5M
5	a	What is a bubble chart? Describe its features and use cases with a diagram.	[CO2, L2]	5M
	b	Explain the advantages and limitations of a bubble chart.	[CO2, L2]	5M
6		Explain the purpose and use of heatmaps with examples.	[CO2, L3]	10M
7		What factors should be considered when choosing the right chart type for data visualization?	[CO2, L2]	10M
8	a	What are the best practices for axis titles, legends, and data labels?	[CO2, L2]	5M
	b	Discuss the role of coloring and scaling in charts.	[CO2, L3]	5M
9		Explain how to create an effective chart, including choosing the right type, labeling, using colors, and scaling. Give examples.	[CO2, L3]	10M
10	a	Define a bar chart and state the use cases.	[CO2, L1]	2M
	b	What is the main difference between a histogram and a bar chart?	[CO2, L2]	2M
	c	Write two advantages of using a scatter plot for quantitative data.	[CO2, L2]	2M
	d	What is the purpose of boxplots in data visualization?	[CO2, L2]	2M
	e	Mention two best practices in labeling and coloring charts.	[CO2, L2]	2M

UNIT III: Multidimensional, Temporal and Hierarchical Data Visualization

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| 1 | Explain the concept of Parallel Coordinates with an example. How are they used for multivariate data analysis? | [CO3, L3] | 10M |
| 2 | Describe the construction and interpretation of a Radar Chart. Discuss its advantages and limitations. | [CO3, L2] | 10M |
| 3 | What are the key techniques for Time-Series Visualization? Explain with suitable diagrams. | [CO3, L2] | 10M |
| 4 | How can Animation over Time improve temporal data visualization? Discuss with examples. | [CO3, L3] | 10M |
| 5 | Explain the role of Geographic Data Visualization. Compare Maps and Choropleths with use cases. | [CO3, L4] | 10M |
| 6 | Discuss the working and applications of Treemaps in hierarchical data visualization. | [CO4, L3] | 10M |
| 7 | Explain the design principles and interpretation of Sunburst Charts for representing hierarchical structures. | [CO4, L2] | 10M |
| 8 | Explain the importance of Network and Graph Visualization in analyzing relationships. Give examples of suitable tools or techniques. | [CO4, L3] | 10M |
| 9 | Compare and contrast Multivariate, Temporal, and Hierarchical Data Visualization techniques with suitable examples. | [CO4, L4] | 10M |
| 10 a | What is a Parallel Coordinates Plot? | [CO3, L1] | 2M |
| b | What is the role of Animation in Time-Series Visualization? | [CO3, L1] | 2M |
| c | Differentiate between Maps and Choropleths. | [CO3, L1] | 2M |
| d | Mention some features of a Sunburst Chart. | [CO4, L1] | 2M |
| e | Write challenges in Network Visualization. | [CO4, L1] | 2M |

UNIT IV: Data Visualization Using Python and Dashboards

1	Explain the features of Matplotlib, Seaborn, and Plotly in detail. Compare their advantages, limitations, and use cases with suitable examples.	[CO5, L4]	10M
2	Describe the process of creating static and interactive charts in Python.	[CO5, L3]	10M
3	a Discuss the data visualization capabilities of Pandas.	[CO5, L2]	5M
	b How can Pandas be used to generate quick plots for exploratory data analysis?	[CO5, L3]	5M
4	What are dashboards in data visualization? Explain the role of Dash, Streamlit, and Power BI in building dashboards.	[CO5, L2]	10M
5	Explain the step-by-step procedure to create an interactive dashboard using Dash framework.	[CO5, L3]	10M
6	Discuss the challenges in data visualization using Python and dashboarding tools. Suggest solutions and best practices with examples.	[CO5, L4]	10M
7	Discuss the role of Power BI in business reporting and dashboarding.	[CO5, L2]	10M
8	Explain key steps in transforming raw data into an interactive visual dashboard.	[CO5, L3]	10M
9	Illustrate with a case study how Python visualization libraries can transform raw datasets into meaningful visual insights.	[CO5, L4]	10M
10	a What is the main difference between Matplotlib and Seaborn in Python visualization?	[CO5, L1]	2M
	b Define a dashboard in the context of data visualization.	[CO5, L1]	2M
	c Name two Python libraries used for creating interactive charts.	[CO5, L1]	2M
	d List two types of charts that can be created using Panda's visualization capabilities.	[CO5, L1]	2M
	e Mention one advantage of using Plotly over Matplotlib for data visualization.	[CO5, L1]	2M

UNIT V: Storytelling with Data and Ethical Visualization

1	Define the concept of storytelling in data visualization and explain its significance in enhancing data interpretation.	[CO6, L2]	10M
2	a Identify and describe the key narrative techniques used in data storytelling.	[CO6, L2]	5M
	b Illustrate with a practical example how incorporating a narrative in data visualization improves user comprehension and insight.	[CO6, L3]	5M
3	Discuss the principles of dashboard design and their application in business reporting for effective decision-making.	[CO6, L2]	10M
4	Define misleading visualizations and their characteristics. Provide an example of a misleading visualization and critically analyze its potential impact on decision-making.	[CO6, L4]	10M
5	Examine the various types of bias that can occur in data visualizations and discuss strategies to minimize or prevent them.	[CO6, L4]	10M
6	Explain the ethical principles and best practices that should guide the creation and presentation of data visualizations.	[CO6, L2]	10M
7	Design a visual storytelling framework using a publicly available dataset and describe the structure and rationale behind your design.	[CO6, L4]	10M
8	Compare and contrast dashboards and infographics in terms of their effectiveness for storytelling and communicating data insights.	[CO6, L4]	10M
9	Outline a step-by-step approach for developing a comprehensive storytelling dashboard using real-world data, emphasizing design, functionality, and narrative flow.	[CO6, L3]	10M
10	a Define storytelling in data visualization.	[CO6, L1]	2M
	b Name two narrative techniques used in data storytelling.	[CO6, L1]	2M
	c What is a dashboard in the context of business reporting?	[CO6, L1]	2M
	d Give examples of a misleading visualization.	[CO6, L1]	2M
	e Mention ethical principles to follow in data visualization.	[CO6, L1]	2M