

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Fifth Semester

Computer Science and Engineering (AIML)

20AMPW501 - DATA VISUALIZATION TECHNIQUES WITH LABORATORY

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. What is a common use of pseudo code in the visualization process? (a) For creating visual designs (b) For algorithm design and planning (c) For data collection (d) For data cleaning	1	K1	CO1
2. What type of visualization is best for showing the relationship between two variables? (a) Histogram (b) Pie Chart (c) Line Chart (d) Scatter Plot	1	K1	CO1
3. Which of the following types of data is categorized based on numerical and categorical properties? (a) Unstructured data (b) Structured data (c) Time-series data (d) Spatial data	1	K1	CO1
4. The purpose of taxonomies in data visualization is to: (a) Store large datasets (b) Create interactive dashboards (c) Categorize and organize different types of visual representations (d) Analyze time-series data	1	K1	CO2
5. What is the primary focus of Gibson's Affordance Theory in visualization? (a) Data accuracy and precision (b) The user's perception of how they can interact with the visual elements (c) Data compression techniques (d) Mathematical modeling of visual data	1	K1	CO2
6. In a model of perceptual processing, which of the following is the initial stage? (a) Data Analysis (b) Sensory Input (c) Interpretation of Data (d) Decision Making	1	K1	CO2
7. Dynamic spatial data refers to data that: (a) Changes over time (b) Is static and unchanging (c) Only represents two dimensions (d) Is limited to geographical information	1	K2	CO3
8. Which of the following is an example of one-dimensional spatial data? (a) A map of a city (b) Elevation profiles along a hiking trail (c) A topographic map (d) A 3D model of a building	1	K1	CO3
9. Which of the following spatial data types is most suitable for representing the layout of a floor plan of a building? (a) One-dimensional data (b) Two-dimensional data (c) Three-dimensional data (d) Dynamic data	1	K1	CO3
10. Which of the following is an example of visualizing point data in geospatial analysis? (a) Heat maps representing temperature variations (b) Mapping the locations of bus stops in a city (c) Contour maps representing elevation (d) Satellite images of forest cover	1	K1	CO4
11. Visualizing spatial data is particularly useful for: (a) Representing static time-series data (b) Analyzing numerical trends without spatial context (c) Understanding patterns, distributions, and relationships in geographic locations (d) Designing user interfaces for web applications	1	K1	CO4

12. What type of geospatial data would be used to represent the migration paths of animals over time? *1 K2 CO4*
 (a) Point data (b) Line data (c) Area data (d) Time-series data
13. Which technique is most appropriate for visualizing multivariate point data? *1 K1 CO5*
 (a) Heat maps (b) Scatterplot matrices (c) Line charts (d) Pie charts
14. Region-based techniques in multivariate data visualization are particularly useful for: *1 K2 CO5*
 (a) Showing individual locations with specific coordinates
 (b) Visualizing temporal changes in data
 (c) Representing data values that are associated with specific areas or boundaries
 (d) Tracking movements over time
15. A hierarchical structure is best visualized using: *1 K2 CO5*
 (a) Line-based techniques (b) Scatterplots (c) Tree diagrams (d) Choropleth maps
16. Displaying arbitrary graphs or networks in geospatial visualization often faces the challenge of: *1 K2 CO5*
 (a) Limited data storage
 (b) Overlapping nodes and edges leading to a cluttered view
 (c) Insufficient computational power for rendering
 (d) Lack of data analysis techniques
17. In the context of designing visualizations, which research direction focuses on improving the initial understanding of data? *1 K2 CO6*
 (a) Developing new types of data storage systems
 (b) Enhancing user interfaces for visualization software
 (c) Creating methods for better data preprocessing and cleaning
 (d) Increasing hardware capabilities for faster data rendering
18. A significant research challenge in applying cryptography to visualization involves: *1 K2 CO6*
 (a) Finding ways to make visualizations more colorful
 (b) Balancing the trade-off between data security and system performance
 (c) Designing hardware for faster data rendering
 (d) Developing new types of charts for data analysis
19. A key research direction in the visualization of digital twins involves: *1 K2 CO6*
 (a) Enhancing physical data storage capacity
 (b) Improving the fidelity and accuracy of real-time simulations
 (c) Developing cryptographic methods for encryption
 (d) Reducing the number of visual variables used in charts
20. Which of the following is a current research focus in addressing data issues in visualization? *1 K1 CO6*
 (a) Designing new color schemes for charts
 (b) Improving techniques for handling large and complex datasets without loss of performance
 (c) Developing more user-friendly spreadsheet software
 (d) Reducing the size of IoT devices

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. What are the key steps in the Visualization process? *2 K1 CO1*
22. How do you interpret a scatter plot? *2 K1 CO1*
23. List the categories of visual variables. *2 K1 CO2*
24. Recall about perception with an example. *2 K1 CO2*
25. What is probing in Two-dimensional spatial data? *2 K1 CO3*
26. Compare two-dimensional and three-dimensional spatial data. *2 K2 CO3*
27. What is the map generalization in Geo spatial data Visualization? *2 K1 CO4*
28. Write a short note on Visualization of Point Data. *2 K2 CO4*

29. Write the significance of Bar chart in Region-Based Techniques. 2 K2 CO5
30. Compare Issues of Cognition, Perception, and Reasoning. 2 K2 CO6

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) i) What is pseudo code, and how is it applied in creating visualizations? 5 K2 CO1
- ii) Assess the relationship between data visualization and fields like statistics, computer science, and psychology. 5 K2 CO1

OR

- b) i) Explain the differences between structured, semi-structured, and unstructured data. Provide one example of each type. 5 K2 CO1
- ii) How does a scatter plot help identify relationships between two variables? 5 K2 CO1

32. a) Examine the different stages of the visualization process. Choose a dataset and describe how you would apply each stage to create an effective visualization for that dataset. 10 K4 CO2

OR

- b) Analyze how Gibson's Affordance Theory can be applied to improve user interaction with a specific data visualization tool. Provide examples of how affordances can enhance user experience and understanding. 10 K4 CO2

33. a) Utilize the dynamic data visualization techniques to illustrate changes over time in any dataset. Describe how you would design an interactive visualization to show trends and fluctuations, and the benefits of using dynamic elements. 10 K3 CO3

OR

- b) Apply the concept of one-dimensional data to a dataset of your choice. Describe how you would visualize this data and the types of insights you might gain from your visualization. 10 K3 CO3

34. a) Explain the importance of visualizing spatial data in decision-making processes. 10 K2 CO4

OR

- b) Compare point data, line data, and area data visualization in terms of their strengths and applications in geospatial analysis. 10 K2 CO4

35. a) Utilize the line-based techniques to represent transportation routes on a map and explain their significance in urban planning. 10 K3 CO5

OR

- b) Apply graphics and network techniques to visualize the relationships between various transportation hubs in a city. 10 K3 CO5

36. a) Examine common problems faced in designing effective visualizations and their potential solutions. 10 K4 CO6

OR

- b) Analyze the impact of government regulations on the design and implementation of data visualizations in various sectors. 10 K4 CO6