ICMC - Universidade de São Paulo

SCC 0252 / SCC 5836 - Visualização Computacional

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Lista1
Visualization: Data, Techniques, Applications

1. Describe, in a paragraph, the distinction between the concepts of Data Visualization and Visual Analytics.

2. What is the association between Visualization and Data Science? What is the role of Visualization in that context?

3. What is the association between Visualization and Data Mining? Given a particular data set, when do we resort to Visualization? When do we not? When do we resort to Data Mining? When do we not? What is Visual Data Mining?

4. Draw a comparative table of 5 multidimensional visualization techniques. What are they useful for? What type of observations do they provide? What is their input? What are the advantages and disadvantages? What applications could they support?

5. Visualization Task: Suppose you want to produce a visualization that summarizes and helps as a guide to a web-based course. The course is composed by series of linked web pages plus external links and references. Pages can be classes, tasks or additional information. The user must understand the general structure of the course, verify what pages he/she visited and for how long, and quickly find references given for each class. Describe the elements of your visualization and discuss the possible interactive functionalities the user would have in this context. Draw a schema for your visualization. Justify your choices of visual elements. What would change if the visualization were designed to support the teacher in improving the course?

6. Visualization Task: Given the Data set below, draw the parallel coordinates visualization for it. What can you conclude about the data from the visualization? What alternative visualization would you propose for data such as these: (1) if there were up to 1K data points; (2) if there were over 100K data points.

7. What is the distinction you make between Information Visualization (InfoVis) and Scientific Visualization (SciVis)? Mention two common points and two distinct features between them.

8. What differs InfoVis and SciVis regarding the input formats?

9. What are the main strategies to visualize hierarchies? What distinguishes them? Give an example of a typical application of each type of visualization you mentioned. Give an example of a non-native application of hierarchy visualization.

10. Mention and explain three different types of layout for a tree, as well as their advantages and disadvantages.

Tabela 1: Produtos

Cor	**Preço**	**Peso**	**Volume**	**Quantidade**	**Data de Fab.**
Branco	10	70	100	8	Antes 1995
Vermelho	12	20	30	18	Depois 1995
Branco	30	15	30	20	Depois 1995
Amarelo	30	10	20	10	Depois 1995
Azul	10	60	50	8	Antes 1995
Vermelho	9	30	40	20	Depois 1995
Amarelo	15	30	30	30	Depois 1995
Azul	10	70	100	5	Antes 1995
Branco	20	20	30	3	Antes 1995

11. What are the main strategies for visualizing networks? What are the main applications? What would be the role of centrality measures in these applications? What can be done to improve clutter problems in network visualization? What can be done to support visual analysis of large networks?

12. What are the main pre-processing steps in text mining/visualization?

13. What is Force-based layout? In what circumstances is the force-based algorithm employed in visualization?

14. Described the process used by T-sne to build an embedding in 2D. How would you define its relationship with distances or similarities in original space?

15. Describe the process of LSP and its relationship with reconstruction of distances and neighborhoods in original space.

16. Mention three circumstances in which the use of clustering is benefic in data analysis.

17. Mention three different uses for clustering in data analysis, two of them connected with visualization strategies.

18. What are the most common ways to visualize text collections? Beyond that, what insights are possible when visualizing text using: multidimensional projections, word trees and similarity trees?

19. What is (are) the use(s) for a multidimensional projection (MDP)? What is the input for this type of technique?

20. Mention and explain three different techniques for multidimensional projection, as well as their advantages and disadvantages.

21. What is the role of data summarization in InfoVis?

22. For the HDR data (homework 1): What alternative visualization would you envisage for that type of data and what kinds of explorations do you think they would afford?

23. What is (are) the use(s) for a similarity tree? What is the input for this type of technique? Explain the Neighbor-joining tree. Propose an alternative way to construct a similarity tree. What do you think the advantages of your proposal would be?

24. Think before answering: What would be a reasonable visualization set up and how would you use it to explore a data set in order to perform the following tasks:

    - image categorization.
    - inspection of news in the media in a certain period of time, for the purpose of summarization of main subjects discussed.
    - scientific paper inspection to survey of a particular subject.

25. Think before answering: What would be a reasonable visualization set up to evaluate a set of features extracted from a data set when the purpose is:

    - image classification.
    - text classification.
    - feature selection.

26. Do all the homework left on Moodle - USP.