UNIVERSIDADE NOVA DE LISBOA
Faculdade de Ciências e Tecnologia
Departamento de Informática **MIEI**

Interactive Data Visualization
2015 / 2016

19, December 2015
2 hours

1 - QUESTION 1 [6]

a) Geospatial data is different from other kinds of data in that geospatial data describes objects or phenomena with a specific location in the real world. Most often, to visualize geospatial data a Map Projection is required. Explain what is a Map Projection, why it is necessary, and why there are many different map projections.
b) One common map projection is Mercator projection which is not an area-accurate projection. Explain what is the meaning of not being a area-accurate projection and explain why is not an area-accurate projection. Illustrate with an elucidative example.
c) In spatial data mapping, three known issues may may have a severe impact on the resulting visualization: (i) the chosen class separation; (ii) the use or not of normalization; (iii) and the used spatial aggregation. Explain each one of these issues and explain how they can be addressed.
d) Explain what can happen in Dot Maps when large data sets are drawn on a map. Explain what are the most common approaches in such cases.

2 - QUESTION [6]

The data for visualization should be understood, and eventually pre-processed to address common issues such as missing values, bad data, outliers, etc..

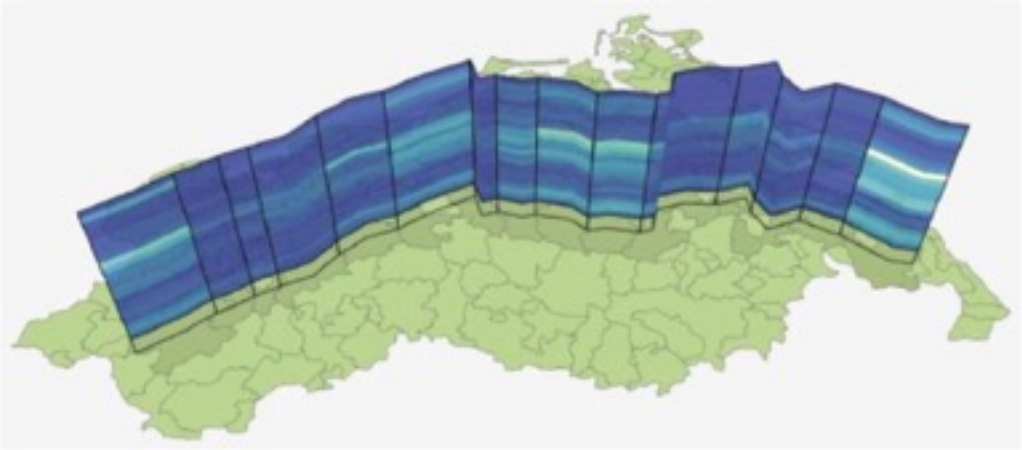
a) Considering the characteristics of Time proposed by Wolfgang Aigner, et. all. complete the following table.

Scale	Ordinal		
Scope	Point-based		
Arrangement			
ViewPoint	Ordered		

b) Considering the characteristics of Time-Oriented data proposed by Wolfgang Aigner, et. all. complete the following table. Explain each characteristics of Time-Oriented data and give some examples.

Scale		Qualitative
Frame of reference		Abstract
Kind of Data	Events	
Number of Variables		

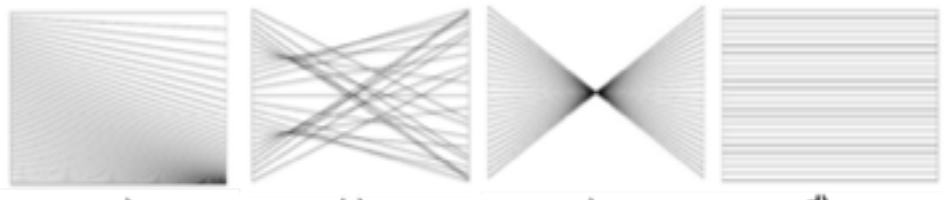
c) To visualize times oriented data the time may be mapped to space or mapped to time. Explain this sentence and give an example of each case.
d) The visualization technique “Great Wall of Space-Time” is illustrated in the following figure.



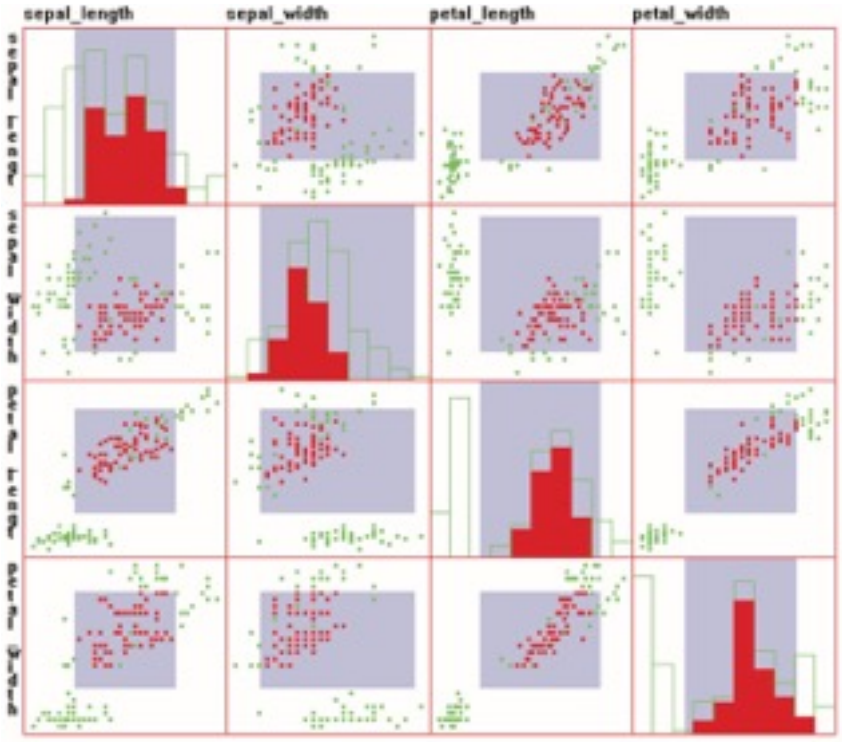
Describe this technique and characterize it in terms of icons, indicating which are applicable. Justify your answer.

3 - QUESTION [4]
a) Consider the following relations which are graphically represented within an orthogonal system.

Indicate which one correspond to a representation with parallel coordinates.



b) Explain the general principles of dimensionality reduction methods. Name one and briefly explain the algorithm.
c) Explain in detail, what is represented in the following figure, namely what is represented in the cells in the diagonal; what is represented in the other cells; what means a green point, and a red point; what are the gray areas.



4 - QUESTION [4]

a) Explain the main interaction operators: navigation; selection; filtering; reconfiguring, encoding; connecting; abstracting/elaborating. Give a simple example of each one.
b) The most appropriate visualization technique for a given situation, depends on many factors, namely the specific task or tasks the user wishes to accomplish and the characteristics of the data. Consider the following catalog of user tasks: identify; locate; distinguish; categorize; cluster; rank; compare; associate; correlate. Explain four of them and give an illustrative example.