Departamento de Informática da
Faculdade de Ciências da
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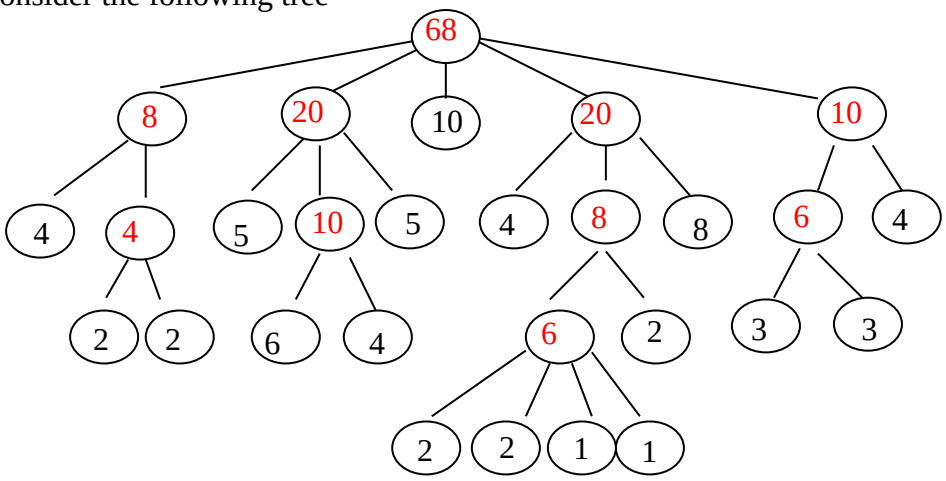
# Visualização
# 2012/2013
# 17th December de 2014
# 2nd Test
# Duration: 1h 30m

**1)**

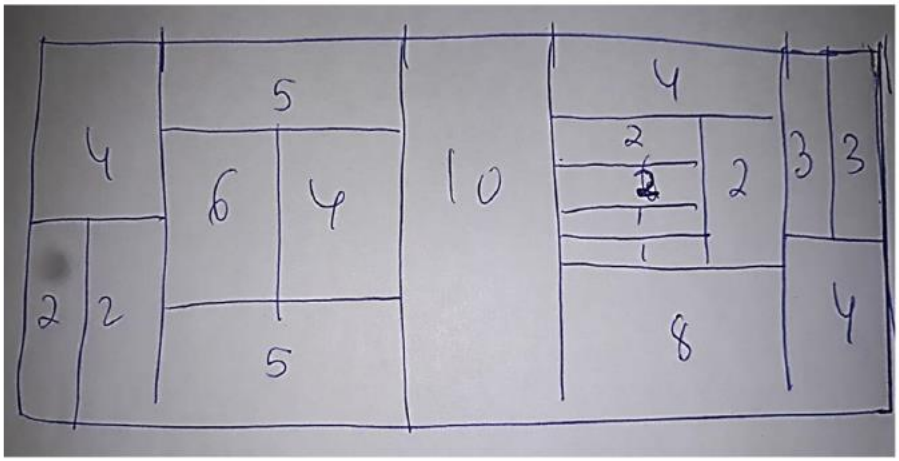
**a)** Describe treemap technique to visualize hierarchical structures.

(see GU-VD-20-6, slides 78-79)

**b)** Consider the following tree




Represent this hierarchical structure as a treemap. Take into account the values of the leaf nodes.



**c)** Consider the following representations of hierarchical structures. Identify the type of each one and compare them.

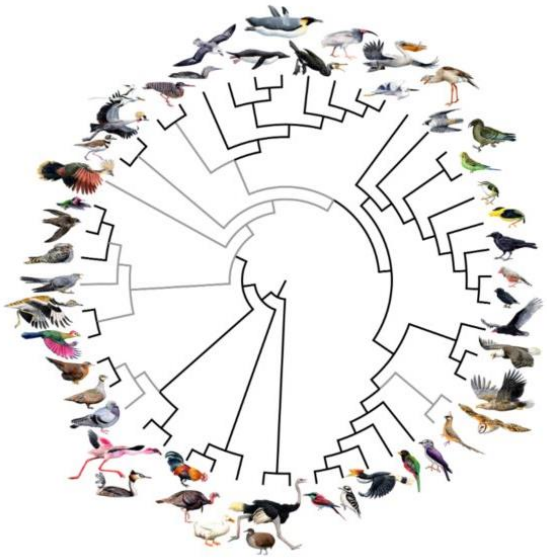


Fig. 1



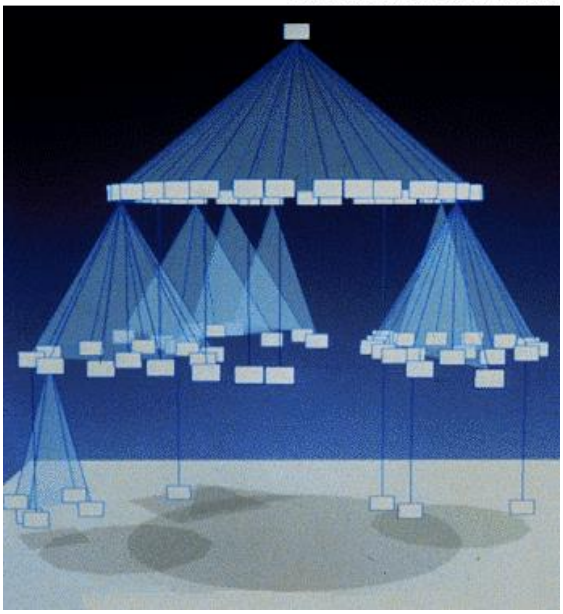


Fig. 2

Fig. 1, Radial Tree, is a 2D representation.

Fig. 2, Cone Tree, is a 3D representation

In a **Radial Tree** there is no need to project the coordinates from a 3D space into the 2D space of screen coordinates (reduces calculations and occlusion of nodes in depth). The root is at the center of the representation area and the leaf nodes are at deeper levels where the circumference is larger and we can represent more nodes. Similar to hyperbolic trees, but without distortion.

The Cone Tree is a 3D representation, therefore a 3rd dimension increases the coordinates space. This means that we can represent more graphical elements, but they may be occluded. We need interaction mechanisms to navigate in the 3D space to examine the hierarchical struture.

**2)**

**a)** What is the difference between multidimensional data and multivariate data?

(see GU-VD-20-6, slides 34)

**b)** For what type of data are parallel coordinates used? Describe this technique.

(see GU-VD-20-6, slide 61)

**3)**

**a)** What are multiscale spaces?

(see GU-VD-20-7, slides 3-5)

**b)** In a multiscale space there are different types of representations**.**

i. Explain how the representations can vary.

The representations can vary in resolutions or can have different types of representation. In the last case we can consider discrete variations like:

- omitting the representation;
- changing the symbol;
- changing the symbol to an approximation of a real object;
- or, increasing the detail.

ii. Describe several criteria that can be used to select the representation.

- Selection according to scale
- Selection by local density
- Selection by DOI

**4)** Off-screen objects technique is used in handheld mobile devices.

**a)** Describe this technique.

Off-screen objects technique uses clues to signal the presence of objects outside the visible area on the screen.

**b)** Give an example of representations used in this technique.

(see GU-VD-20-8, slides 51-66)

**5)**

**a)** With zoom in techniques, which techniques can be used to link the magnified area with the context?

(see GU-VD-20-7, slide 6)

**b)** Describe a technique that displays local detail and global context without deforming the magnified area.

(see GU-VD-20-7, slide 25 and 41-52))

**6)** G. Furnas proposed a degree of interest function that can reduce the volume of data represented.

**a)** Describe the degree of interest function proposed by Furnas.

(see GU-VD-20-7, slide 26 and following)

**b)** Explain how this function can be used as a filter mecanhism.

(see GU-VD-20-8, slide 29)

**7)** Wolfe e Horowitz identified 4 visual features that are important to guide human attention.

**a)** Which are these visual features?

(see GU-VD-20-9, slide 73) color, movement, orientation, size.

**b)** Describe 5 guidelines for the use of color in visualization.

(see GU-VD-20-9, slide 41-42)