Exam JBI100 Visualization

21-12-2021 duration max:2 hours

Name: Student id:

This is an exam where short answer questions and multiple choice questions are combined. For the multiple choice questions, only one answer is correct per question. Write down your answers to the exam questions in this provided document of 7 pages. The total amount of points of the exam is 25 points.

For the multiple choice questions, one point is added for each correct answer; half a point is subtracted for each wrong answer. Nothing is added or subtracted if no answer is given. In short: Guessing can have a negative impact!

Please, mark your answers directly below the exercise or next to it (but always before next question). Of course, the answers are expected to be related to the material given during the course lectures.

Make clear what your answer is; half a point will be substracted for ambiguous answers!

Good Luck!!

1.

ID	Average Temperature(°C)	Country	Season	Year
31	20	The Netherlands	Summer	1994
32	10	The Netherlands	Autumn	1994
33	4	The Netherlands	Winter	1994
34	25	Spain	Spring	1995
	…	…	…	…

a. (1point) Above we have a tabular data set with 5 attributes. Which type of attribute is each of them according to the abstract categorization of Tamara Munzner as given during the lectures (be as specific as possible)?
   1. ……
   2. ……
   3. ……
   4. ……
   5. ……

b. (2 point) We want to visualize the tabular information above. Which visual encodings would be the most effective to visualize all the information on the tabular data set? Name the mark and visual channel per attribute. Provide a short motivation for each:
   1. ……
   2. ……
   3. ……

4. ……
5. ……

Provide a sketch of your answer for the **overall visualization** :

c. (1 point) Which combination of visual channels are separable and which are not from the ones you chose in 1b?

……
……
……
……

2. (1 point) Change blindness is a perceptual phenomenon that
   a. supports the use of animation for changing states
   b. indicates that animation should be avoided to visualize and detect change
   c. supports the use of small multiples for storytelling
   d. indicates that short memory can be used effectively

3. (1 point)

Name two characteristics of a data attribute for which using the colormap above as visual channel would be adequate (shortly motivate):

a. ……
   ……
b. ……
   ……

4. (1 point)
   a. 
   b. 

Which of the colormaps above is a better choice according to what has been seen in this course? Shortly motivate your answer.

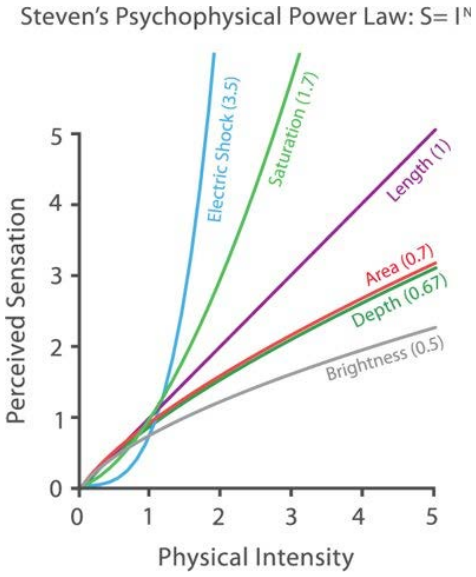
……

……

5. (1 point) Which of the following statements is true?
   a. HSV color model is perceptually uniform
   b. Color space representations/models are 2 dimensional
   c. CIE color model represents all human visible colors
   d. RGB color representation is device independent

6. (1 point) Name three dangers of visualizing non-spatial data in 3D
   a. ……
   b. ……
   c. ……

7. (1 point) We want to map a quantitative sequential attribute weight (W) to Brightness (B). Give the equation that indicates the adequate mapping of W to brightness, B, given Steven's Psychophysical Power Law.



……= ……

8. (1 point) In the visualization below, which principle seen during the lectures is being violated (shortly motivate)?

……
……
……

9. (2 point) Draw the Parallel Coordinates and Scatterplot Matrices (SPLOM) that would correspond to the following table:

Math	Physics	Dance
85	95	70
90	80	60
65	50	90
50	40	95
40	60	80

11. (1 point) Name two levels of Tamar Munzner's nested model:
    a. ……
    b. ……

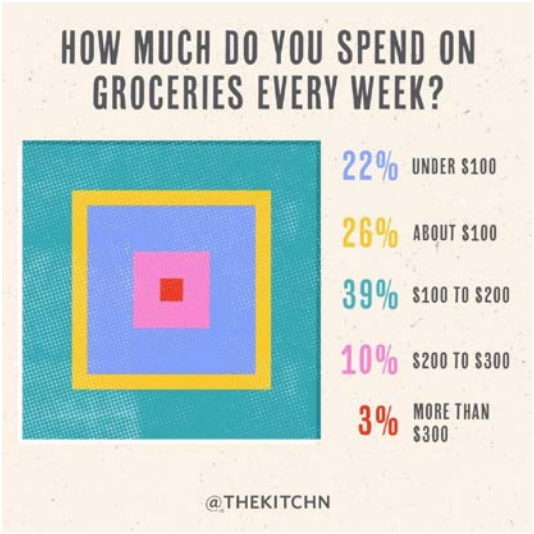
12. (1 point) Which of the he following statements is false:
    a. Tasks put constraints on suitable encodings
    b. Tasks help a designer to reason about a right encoding
    c. The encoding puts constraints on suitable tasks
    d. Tasks are determined after selecting encodings

13. (1 point) Consider the following situation. An aerospace engineer measures the air time of multiple planes with three different plane designs. She wants you to develop a visualization system for her task: "I want to contrast the three airplane designs and understand what the air time characteristics are of each airplane design: what is the average air time, what is the lowest air time, the highest, and everything in between".
    a. What (action, target) pair is a good task abstraction?
       ……
    b. Motivate your choice.
       ……
       ……

14. (1 point) Consider the following situation. An insurance company employee has collected data about claims on cars. He describes his task with the following sentence: "I want to find out if there is a relation between the amount being claimed and the value of the car, so we can set the monthly insurance contract costs (i.e., premium) accordingly."
    a. What (action, target) pair is a good task abstraction?
       ……
    b. Motivate your choice.
       ……

       ……

15. Consider the visualization on grocery spending in the image below.



a. (1 point) Name two visualization principles that are violated and motivate your choices.
   1. ……
   2. ……

b. (1 point) Provide one alternative solution that would fix both violations.

   ……

   ……

   Sketch your alternative solution here:

16. (1 point) A Choropleth map is primarily used to
    a. visualize time-series data.
    b. reduce high-dimensional data.
    c. cluster high-dimensional data.
    d. understand spatial relationships.

17. (1 point) Given a bar chart of a quantitative attribute of 70 items with a categorical key attribute, and the task to compare two specific items, consider:
    a. What is the best way to order the items?

       ……

    b. Motivate your choice.

       ……

       ……

18. (1 point) Which statement is true
    a. A violin plot is preferred over a boxplot because it shows the frequency at each value
    b. A boxplot is preferred over a violin plot because it shows more detail
    c. A violin plot is preferred over a boxplot because it shows less detail
    d. A boxplot is preferred over a violin plot because it can be applied to both categorical and quantitative attributes

19. (1 point) Changing the visual encoding depending on zoom-level is an example of
    a. Geometric zooming
    b. Semantic zooming
    c. A camera metaphor
    d. Constrained zooming

20. (1 point) Yi et. al identifies seven categories of interaction techniques that can be described based on user's intent. The category 'Encode' can be described as
    a. Mark something as interesting
    b. Show me more or less detail
    c. Show me a different representation
    d. Highlight related items

21. (1 point) Assume you have a dataset with properties of a car. The dataset consists of 8 quantitative attributes (acceleration, weight, horsepower, ..). You want to show the relation between all dimensions in a single visualization.
    a. What visualization idiom would you use for this?
       ……
    b. Motivate your choice.
       ……

       ……