



UNIVERSITY
OF SKÖVDE

WRITTEN EXAMINATION

Course – Visual Data Analysis

Examination – Written test

Course code – IT824A

Credits for written examination – 3.5

Date – 2026-03-24

Examination time – 8:15-12:30

Examination responsible: Tove Helldin

Teachers concerned: Juhee Bae

Aid at the exam/appendices: no aid

Other

Instructions

- Take a new sheet of paper when starting a new question.
- Write only on one side of the paper.
- Write your name and personal ID No. on all pages you hand in.
- Write your name and personal ID No. on the question sheet which is to be handed in for answering questions 14 and 15.
- Use page numbering.
- Don't use a red pen.
- Mark answered questions with a cross on the cover sheet.

Grade points:

- F: ≤ 32
- E: 33-36
- D: 37-40
- C: 41-44
- B: 45-49
- A: 50-54

Examination results should be made public within 18 working days

Good luck!

General information about the test

The test contains 15 questions. How many points a question is worth is indicated. The total number of points for the exam is 54.

Read the questions carefully and answer what is asked for.

Also have a look at the general instructions on the test front page. Questions 14 and 15 are to be answered using the question sheet. Make sure to write your name and personal ID number on the question sheet as well!

1. When choosing appropriate visualizations for a task, the development team often creates a so called "*persona*". What is a persona and how it is used within a development process? Exemplify a persona with an example (i.e. draw and write it). (4 points)
2. When analyzing the findings from a user evaluation, one often classifies the findings in terms of *scope* and *severity*. Describe these two concepts. (2 points)
3. Explain what the *Gestalt principles* can be used for when designing a visualization. Select two [2] of the principles and illustrate them through **one [1] example each**. Explain and motivate the two examples. (5 points)
4. Explain and motivate why it is important to have the limitations of human *short-term memory* in mind when designing. Give one [1] practical example of how knowledge of human short-term memory can be incorporated into the design of a visual product. (4 points)
5. Colin Ware discusses the concept of "*visual queries*". Explain this concept and how it should be used when designing visualizations. (3 points)
6. Describe one [1] positive and one [1] negative aspect of performing a *heuristic evaluation*. Motivate your answer. (2 points)
7. Describe the concept of "*progressive disclosure*" when designing an interface and how that should affect your design. (2 points)
8. A faulty visualization is provided (Figure 1). Identify at least three [3] significant problems with the visualization. For each problem you identify, explain why it is an issue based on visual analytics principles, and propose a specific improvement that would address the problem. (4 points)

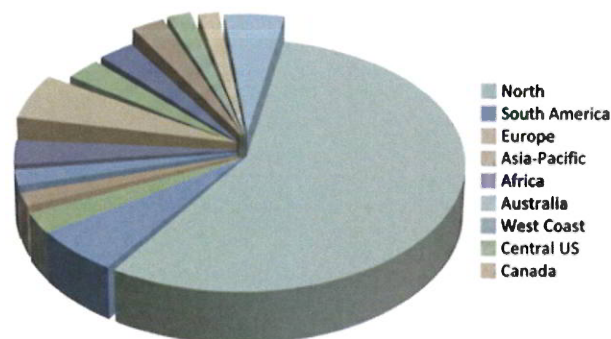


Figure 1: Visualization for question 8.

9. A faulty visualization is provided (Figure 2). Identify at least three [3] significant problems with the visualization. For each problem you identify, explain why it is an

issue based on visual analytics principles, and propose a specific improvement that would address the problem.

(4 points)

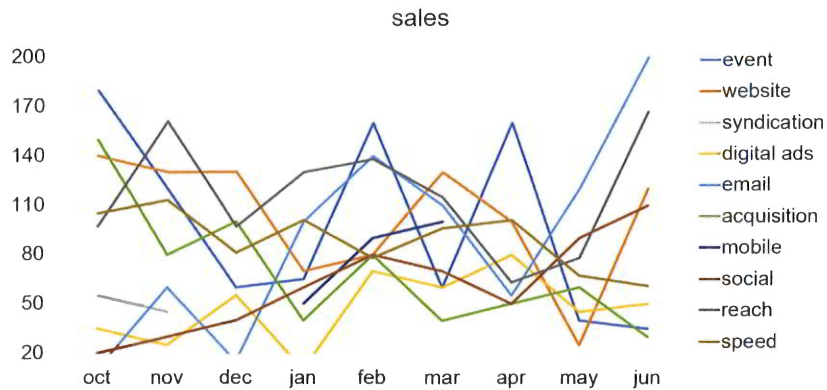


Figure 2: Visualization for question 9.

10. Analyze the figure below (Figure 3) displaying "Revenue" and "Customer satisfaction" on two independent Y-axes (one left, one right). Identify at least three [3] significant problems with the visualization. For each problem you identify, explain why it is an issue based on visual analytics principles, and propose a specific improvement that would address the problem.

(4 points)

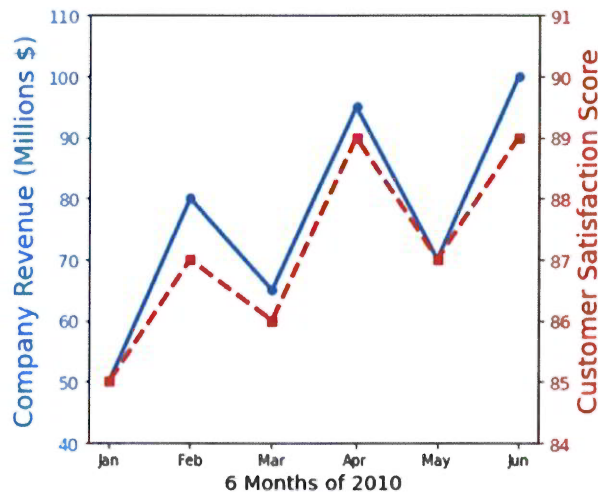


Figure 3: Visualization for question 10.

11. Compare *filtering* vs *brushing* in interactive visualization, and identify the key difference.

(3 points)

12. Compare the *scatterplot* vs *bar chart* visualizations in terms of task, data/attribute type, and visual encoding.

(4 points)

	scatterplot	bar chart
task	fill in text	fill in text
data/attribute type	fill in text	fill in text
visual encoding	fill in text	fill in text

13. Explain the concept of *preattentive processing* in visualization. Then provide a “real-world” example showing how it is used, clearly stating which visual channel makes the information stand out immediately. (3 points)
14. Quiz question: Write “O” if the statement is true and “X” if the statement is false in the brackets. Only O/X allowed — everything else is incorrect. Indicate your answer on the question sheet. Mind to write your name and personal ID number on the question sheet. (5 points)
- (a) Boxplots can be misleading if used to compare means in skewed distributions.
 - (b) Scatterplots with a near-zero slope and widely scattered points indicate a very weak linear correlation.
 - (c) Pie charts are effective for comparing small differences between 12 categories.
 - (d) Employing a line chart with more than a dozen distinct color hue variations is an effective strategy to differentiate multiple temporal categories.
 - (e) Choropleth maps are well suited for displaying raw totals across regions of very different sizes.
 - (f) Heatmaps are not useful for spotting clusters in large datasets.
 - (g) Line charts always show the exact magnitude of change better than bar charts.
 - (h) Using sequential color scales that vary in color brightness in a choropleth map ensures that small inter-regional differences are perceptually clear to the observer.
 - (i) Bar charts with categorical axis are appropriate for displaying nominal data with no inherent ordering.
 - (j) Stacked bar charts are effective for comparing subgroup composition across groups when the number of subcategories is limited.
15. In visualization design, understanding the distinction between *task abstraction* and *data abstraction* is crucial. For each of the following statements, select the one that applies (Only T/D/B allowed — everything else is incorrect.): (5 points)
- T: Task Abstraction
 - D: Data Abstraction
 - B: Both Task and Data

Indicate your answer on the question sheet. Mind to write your name and personal ID number on the question sheet.

- (a) Determine which variables to identify and visualize clusters.
- (b) Defining whether the goal is to explore trends, detect anomalies, or identify clusters.
- (c) Determining the temporal, categorical, or quantitative nature of attributes.
- (d) Mapping data attributes and user goals to appropriate visualization techniques.
- (e) Designing interactions that allow users to drill down or pivot views.
- (f) Prioritizing which trend patterns are most important to highlight in a visualization.
- (g) Selecting and extracting subsets of the dataset to identify outliers or patterns relevant for further analysis.
- (h) Reflects the “what” behind the visualization.
- (i) Designing drill-down interactions for exploration.
- (j) Determining appropriate data transformations for normalization or scaling.