

Exercise 5: Color Perception

(20 points)

Due: 22.05.2024 10 AM (extension due to bank holiday)

This exercise aims to improve the understanding of the influence of human (color) perception on interpreting visualizations.

Please find yourself in groups of **2 students**. Only 1 member of the group must submit the exercise in ILIAS.

Instructions:

1. Download the attached folder named "Exercise05", which contains the necessary files for your programming task: an HTML file, a CSS file, and three JavaScript files.
2. The JavaScript file conversion.js must not be touched.
3. Edit each of the files according to the tasks provided in the exercise.
4. Ensure that all changes you make are visible when opening the "index.html" file with your web browser.
5. Compile all the modified files into a zip file named "Exercise05_submission.zip" for submission.

Task 1: Theoretic Concepts and Applicability

(15 points)

Provide your answers to the questions directly in the HTML file.

Task 1 a) – Please explain why the just noticeable difference (JND) used in CIELab does not apply to data visualizations perfectly. What are the consequences, and how can you deal with them?

Task 1 b) – Please visit the following webpage (<https://colorbrewer2.org/>) and select the options:

Number of data classes: 12

Nature of your data: qualitative

Pick the color scheme called "12-class Set3".

Despite the drawbacks already mentioned on the webpage (not color blind friendly, etc.) and the discussion about JNDs in task1a, what is another disadvantage when applying this color scheme to my data with 12 different categories?

Task 1 c) – Switch the options to:

Number of data classes: 4

Nature of your data: qualitative

Pick the color scheme called "4-class Set3".

After applying a smaller number of data classes, the colormap gets cropped. What is the problem after cropping the color map, and what would be a better approach to selecting four colors from this palette? Which four colors from this palette (Set3) would you choose to encode four different categories? Base your arguments on facts, numbers, or figures, NOT assumptions. For a convincing answer, you might want to implement something. Check out the index.js file for some help.

Task 2: Color Perception**(5 points)**

Baden Württemberg has decided that the only way to alleviate traffic on the B33 is to introduce variable speed limits that they can dynamically change depending on traffic conditions. Unfortunately, the state does not have enough funding for digital speed limits. As a result, they are replacing speed limit signs with colored lights.

Task 2 a) – Your job is to construct mapping rules that translate any number from 0 to 100 to a unique color. You will choose a color for 100 and one for 0 and determine a way to translate any target speed into a color. What are your thoughts when creating the mapping?

Task 2 b) – Once you have your scheme, choose five random numbers (not ordered) between 1 and 100. Create five copies of the digital traffic light from task 2a and display those five random numbers.

Task 2 c) – After visualizing the data (task 2b), comment on your chosen color mapping. What are the advantages and disadvantages of your mapping scheme?

Submission: Zipped Exercise05 folder, including all files