30 **Exercise 5: Human Color Perception**

This exercise produces a tool in which you can test your color perception ability. The idea is to develop a small GUI with the following capabilities:

- The whole application is displayed in a window frame which can moved, iconized/de-iconized, and closed.
- The frame contains a display part and a UI part.
- The display parts displays two images side by side, with no frames or borders around the images. The two images must directly border each other. The size of both images is the same and is 300x300 pixels.
- All pixels of each image have the same RGB color.
- The UI part, located above the two images, allows to choose the RGB color of each image. Each of the R, G, and B channels is settable both by entering an integer value in a value entry box, or by moving a slider.

In order to solve the exercise, perform the following steps:

1. Draw a picture of how the GUI should look like. You can use a GUI design tool to select and arrange the respective widgets and just print the finished design in a pdf document.
2. Outline an implementation plan by describing the major steps of functionality to implement and the testable intermediate results.
3. Develop and test the application according to the plan.
4. Once the application is finished, write a one-page user documentation.
5. Using the application, perform the following experiments:
   (a) Set the color of both images to rgb[127,127,127].
   (b) Change the color of the right image, by increasing/decreasing each of the channels by 1, 2, 3, etc. and check each time, whether you can already detect a difference. Make changes until you can see a difference and determine the L3 norm betweem the RGB values of the left and right images.
   (c) Repeat this experiment with initial values rgb[255,0,0], rgb[0,255,0], rgb[0,0,255], rgb[0,0,0], rgb[255,255,255], rgb[255,255,0], rgb[255,0,255], rgb[0,255,255].
   (d) Repeat the experiment with at least three of the above initial values, but now changing only a single channel?
6. Summarize the findings of your experiments by writing a paragraph with at least 10 and at most 20 lines of text.