Research Methodology for Data Science CS4125

Assignment C

This assignment is concerned with the implementation in MATLAB of methods that were discussed in the lectures. Tips on how to implement the methods and hints on useful MATLAB functions were provided in the lectures and can be found in the lecture slides on Brightspace.

Task 1: *Gradient-based Image Sharpening*

Implement the method for *Gradient-based Image Sharpening* that was discussed in the lectures. The input is an image and parameters c_s and $c_{\overline{U}}$ that control the scaling of the gradients and the term that penalizes the deviation from the input image. The output is the sharpened image.

Task 2: *Gradient-based Image Blending*

Implement the method for *Gradient-based Image Blending* that was discussed in the lectures. The input are one or more source images and selections in the images and a target image with selected regions in which the sources are placed. The method blends the sources into the target image.

Remark: You may assume that the selected regions in the source and target images have the same shape. I could help to first implement a method that assumes the regions to be rectangles. You can prepare examples using an image processing software.

In addition to implementing the methods, you are expected to test the correctness of your implementation, evaluate the resulting tool to see how useful it is for applications, and to document the algorithms you use, the functionality your implementation offers and how it is used.

Task 3: *Report*

Write a report that describes and illustrates

- the algorithms implemented
- the functionality the implementation offers
- how the implementation can be used
- the tests for correctness of the implemented algorithms you performed
- your evaluation (discussion of benefits and limitations) of the method for the applications

In addition, you can report on the division of labor amongst the group members.

Required deliverables on Brightspace:

- For Tasks 1 and 2, provide the MATLAB notebooks (.m files) and example images. Pack all the files in one ZIP archive.
- The report should be one PDF file

Deadlines: April 8, midnight: Final versions of required documents must be uploaded