Gebze Technical University - Computer Engineering Department

CSE464/564 – Digital Image Processing, Fall 2018-2019
Extra Homework

This homework is OPTIONAL. You don't have to complete it. In case you do however, your overall homework score will be calculated using your best 3 best homeworks out of 4.

Rule 1: no plagiarism (from colleagues or other sources). Detected cases of plagiarism will lead to a significant penalty of your course grade at the end of the semester.

Rule 2: You are asked to write some methods, you can use C/C++/Java/Matlab/Python. You can use readily available software libraries for loading, creating, displaying image files, as well as for getting/setting pixel values and reading image dimensions. **Anything else you have to code it on your own!**

Rule 3: no late submissions! Learning to plan your schedule according to deadlines is part of your education and an invaluable professional skill.

What to submit: a) the source code of your methods and b) a well formatted report
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Our topic is pixel description and classification.
You'll find attached 3 images.

pan.png: 8-bit grayscale image of the city of Reykjavik, Iceland.
GT.png: your ground truth for pan.png. The labeled pixels have a value in {1,2,3,4,5,6}.
train.png: your training image in the same format as GT.png.

Your task is to develop a system that will train itself with the labeled pixel of train.png and then you'll test your trained system with all the labeled pixels in GT.png in order to evaluate your system by calculating the classification accuracy and the kappa statistic (both provided by weka).

Your task consists of two parts.
a) calculating a feature vector describing a single pixel.
b) training and classifying the feature vectors calculated in step (a). For this part you'll use the weka software and the nearest neighbor classifier (https://www.cs.waikato.ac.nz/ml/weka/).

As far as part (a) is concerned, you are to calculate the following feature vectors per pixel:

- Its 8-bit grayscale value (mono-dimensional)
- The histogram of the 9x9 window centered on the said pixel
- The mean and variance of the 9x9 window centered on the said pixel
- The granulometry of the 9x9 window centered on the said pixel
- The graylevel co-occurence matrix of the 9x9 window centered on the said pixel

You will send all your source code, and of course a report about your experiments and your findings with classification scores and screenshots.

Good luck.