Autumn2022

CSC8628- Assignment

Submission Due: Thurs 12th January '23 | Demonstration: w/c 9th January '23

Brief

The assignment consists of one main task: image denoising and involves algorithmic development. Your task is to design and develop algorithms, preparation of the results and write a report. The report should include

1. a brief introduction to the problem (you are encouraged to cite a couple of current literature),
2. description of your algorithm including flowchart(s),
3. short description of the libraries/function you have used in the work,
4. presentation of the results,
5. key findings from the results and associated discussions and
6. conclusions.

You need to demonstrate (**compulsory**) the code and answer related questions on designated days. If you fail to demonstrate (/absent), the entire corresponding task(s) will be marked as zero.

The submission should include:

1. A PDF report
2. A .zip file containing Python code in Jupyter Notebook format.

TASK: Image denoising

Image denoising is a fundamental image processing problem and the basis for a pre-processing step for many advanced computer vision tasks. Your task is to

1. Design and development of your own denoising algorithm that **must involve Fourier Transform**. While designing the algorithm you may want to
    a. Consider adding further pre-processing and post processing steps of your choice,
    b. Get inspiration from existing literature (one or more) which you must cite in your report and code.

    The input to your code will be original and noisy images. The output will be denoised image and scores of comparison metrics.

    [40]
2. Compare your algorithm with the following denoising methods.
    a. Mean filter
    b. Median filter
    c. Wavelet denoising (e.g., VisuShrink or BayesShrink) **[10]**
3. Compare the original and denoised images using two metrics, such as,
    a. Mean Squared Error (MSE) and
    b. Structural SIMilarity (SSIM) index **[5]**
4. Generate and report results with graphs/tables (and sample images) using the given dataset of 25 original and noisy images. Data acknowledgement: The Berkeley Segmentation Dataset and Benchmark https://www2.eecs.berkeley.edu/Research/Projects/CS/vision/bsds/ **[5]**

5.	Write a report as described at the beginning of the brief.	**[40]**
6.	Demonstrate your code and answer questions.	**[pass/fail]**
	Total for the TASK	**[100]**

NOTE 1: You can use suitable main library functions for the tasks.

NOTE 2: Marks in #1 & #5 will be considered based on your innovative approach.

Submission

The assignment is worth 100% of the overall grade for CSC8628 and is compulsory. It should be in the order of 1,000 words in length (excluding the figures, tables and references). It should be submitted as a PDF and python codes.

Referencing

You must follow the IEEE referencing style details which can be found here:
https://ieeeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf

Plagiarism

Work which is submitted for assessment must be your own work. Plagiarism means presenting the work of others as though it were your own. Further details about the university policy on plagiarism can be found here:

https://www.ncl.ac.uk/academic-skills-kit/good-academic-practice/plagiarism/

Marking and feedback

Marks will be given for all tasks and sub-tasks. Please note that the marking will not be linear, which means achieving higher grades will be increasingly challenging and should meet the expectations (and beyond) of the marking scheme.

Written feedback will be provided along with the marks within 20 working days of the submission deadline. If you are not satisfied with the marks and feedback, you are welcome and encouraged to discuss individually with Dr Bhowmik.