Assignment 1

TDS3651 Visual Information Processing (10%)

Due: Sept 6, 2019

1 Introduction

1.1 Objective

To design an algorithm that automatically enhance a set of satellite images. A set of 30 satellite images, along with the corresponding enhanced image, is provided for you to design the enhancement algorithm. An example of an input satellite image and an enhanced imaged is shown below:

Input Image Enhanced Image

1.2 Guidelines

- This is an individual assignment.
- In regards to the objective of this assignment, you are NOT allowed to use third-party packages to assist you in this problem. Packages 'pip'-ed from Python Package Index (PyPI) are acceptable. { Important: Do not upload your own packages or algorithms that you have created for this assignment to public repositories such as Github/BitBucket, which may allow others to "use" portions of these packages to solve the same assignment. (You can do so after the assignment is over). All assignments will be scrutinized in this aspect.
- You can use Spyder (which comes with iPython console), but you can use your own favourite IDE or opt for basic text editor & command line.
- This assignment is worth 10% of coursework marks.
- Late-Day policy applies.
- Submission deadline: **September 6, 2019, 11.59PM**. There will be 3 extra days before hard deadline.

3 Scripts and Functions

3.1 Codes to Write

Your working function `**enhanceImage**' that you need to write is contained within **'imageEnhance.py'**

def enhanceImage (img):

```
    # write your code here
    ...
    return outputImg
```

The inputs and output of the `enhanceImage' function are as specified follows:

inputImg:Input image, a 3D numpy array of row*col*3 in BGR format

outputImg: Enhanced image

No visualization codes or functions were provided. You have to write your own for purpose of visualizingthe outputs or to generate nice figure/plots for reporting.

3.2 Evaluation Functions

An evaluation function is provided to test your algorithm:
_ **evaluate.py**: Evaluate the similarity score between a set of output images with the corresponding groud truth images and return the average similarity score for the image set.

The functions are runnable on Anaconda Prompt or standard command-line prompt (if necessary path settings have been configured). You can use the `-h' switch to get further help on how to use these functions, and what other options are there.

NOTE: You are NOT ALLOWED to change the code of this function except changing the **Default Parameters**, which include the image directory and number of images in the directory.

3.2.1 Package Requirement

The vanilla Anaconda installation does not come with the PrettyTable package. Please install via pip at Anaconda Prompt.
>>pip install prettytable

3.2.2 Example of Usages

This command to evaluate all image:

>>python evaluate.py -v
This command enhances and evaluates the whole image set in the directories specified under the **Default Parameters** on the simple result display setting as follows:

DETAILED RESULTS

Image	Similarity Score
1	0.7144
2	0.6609
3	0.7892
4	0.6825
5	0.7304
6	0.7195
7	0.7416
8	0.6859
91	0.7721
10	0.7702
All	0.7198

To perform this full evaluation on another image set, simply change the Default Parameters in the evaluate.py file to specify the file directories and the number of images.

3.3 Evaluation Sets

There are 2 sets of evaluation satellite images. One is released earlier for you to design your algorithm under the '**test**' folder, if you are able to get a good accuracy with this dataset, it's a job well done already!
The second set will be released one week before submission deadline, consisting of satellite images with more variations and captured under challenging scenarios.

4 Submission

Submit the following in a ZIP file via MMLS Assignment page:

- **Code**: *imageEnhance.py*and all other additional support codes (if any)
- Report (in PDF): Proposed outline:
    - Abstract (short)
    - Introduction (short)
    - Description of Methods
    - Results & Analysis
    - Suggestions for Improvement

Please do not submit anything in hardcopy (report) or in stored media (CD/DVD) form.

4.1 Mark Distribution

The following table shows the mark distribution for this assignment:

Code (10%)	Methods Used	3
	Creativity/Originality in Solution	2
	Visualizations	2
	Clarity/Readability	1
Report (10%)	Abstract (short) & Introduction	1
	Description of Methods	2.5
	Results & Analysis (including Ablation Studies)	2.5
	Suggestions for Improvement	1
TOTAL		**15 marks (10%)**
Bonus (max. 1%) — for exceptional achievement in similarity score results.		

End of Assignment 1 Guideline
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