

Special Topic on Image Engineering: Advanced Image Restoration and Quality Enhancement

Homework Assignment 4

Implementation and Verification of deep learning based image dehazing networks

The fourth home assignment is to implement a given deep neural network for single image dehazing and to train it properly. After training, the performance verification is required for test images by providing the performance measures in terms of NIQE score which is the no reference image quality assessment metric.

The data set for experiments is provided via the below Dropbox link where the Indoor training and test sets and Outdoor training and test sets are found. The evaluation of the submitted trained networks for Homework Assignment 4 will be performed based on the performance for the test images.

Dataset

- Training samples:
 - Indoor: 25 image pairs (4K resolution)
 - Outdoor: 25 image pairs (4K resolution)
- Test samples:
 - Indoor: 5 images (4K resolution)
 - Outdoor: 5 images (4K resolution)
- Download links:
 - Training/test data: https://www.dropbox.com/s/wc3b0q0d3querb3/Dehazing_datasets.zip?dl=0
 - You can use the previous skeleton code.

Implementation

- You have to use **GAN-based model**.
 - You can use any GAN model
 - The architecture of the generator is U-net based CNN model.
 - The architecture of the discriminator is not determined (You can select any architecture)
- Training patch size: $N \times N \times 3$ RGB images (N is any numbers)
- Batch size: any number (defined by users)
- You can use any optimizer.
- You can use several data augmentation techniques such as randomly flipping horizontally and vertically, and rotating by 90 degrees etc.
- Other hyper-parameters for training can be freely selectable.

The following deliverables must be submitted:

- Both training and test codes (PyTorch)
- Readme.txt describes how to run your code, information of your code structure.
- The objective quality scores results for the test images must be submitted.
 - You can calculate NIQE scores using the uploaded evaluation code.
 - https://www.dropbox.com/s/10d6y4eakeku4i1/evaluation_code.zip?dl=0
- Report
 - Experimental conditions
 - The dehazed images produced by your test code for the test images
 - We will calculate the score for your dehazed images again.
 - The NIQE scores for the test images must be included
 - **The assignments will be graded based on average NIQE score.**
 - The analysis of your results and a simple code description for each component of the neural network

Submission

- Due date: **2020-12-14 (Monday) 23:59**
- Submission should go to the class TAs at: jhoh94@kaist.ac.kr
- Submission format
 - Your report must include your name, student ID and e-mail
 - Your report must be in ZIP format with following directories:
 - ✓ You do not include the train and test data in your ZIP file.
 - ✓ `source` where readme.txt, training code and test code must reside
 - ✓ `report` where your report is put
 - The file name of your submission should be “HW4_studentID_YourName.zip”.
 - **<NOTE: If your train and test code are not working, your implementation score is zero!!!>**