**Image Processing Project 2**

**Materials and Implementation of**

**(one week)**

**Image Processing Part**

1. Learn the difference between double and uint8 operations. Why we always convert an image to double?
2. What is the or, xor operation of image processing and how to implement it?
3. Learn all the types of image noises. Add some noise (e.g. salt and pepper) in a good image. Learn the mean filter and implement it into the noised image (image denoising field).
4. learn linear and nonlinear filters;

Including (but not limited) all types of mean filters and Kuwahara filter, all types of median filters. Please also try to include more filters in this project.

1. Learn the evaluation methods and use them to measure the image quality, e.g. PSNR, MSE, SSIM (not limited). Using these quality measures to improve the image denoising methods by changing the parameters based on different filters.

**Machine Learning Part (The link is for reference only)**

1. Learn the Single-layer Neural Networks (Perceptrons)

<http://computing.dcu.ie/~humphrys/Notes/Neural/single.neural.html>

1. Learn Feedforward neural network and explain it.

<https://en.wikipedia.org/wiki/Feedforward_neural_network>

1. Learn the Multilayer Perceptron (MLP)

* pretrain by stacked sparse autoencoder,
* finetune with back propagation algorithm,
* predict using feedforward pass.

<https://github.com/iamhankai/mlp_demo>

**Submission:**

(1) You should show me a project report with your source codes as appendix. One sample reports is attached for your reference.

(2) You are expected to give a 20-minute presentation in English to me (recommended) such that I will know how much you have learnt from the project. You also are recommended to send your PPT file to me before the presentation day.