Mathematical Foundations for Computer Vision and Machine Learning

Byung-Woo Hong

Computer Science Department, Chung-Ang University

Assignment 4

Jupyter Notebook

- Create a new notebook for Python 3
- Include your name and the student ID in the notebook
- Write python 3 codes for the given assignment
- Try to separate the codes into meaningful blocks
- Write a comment for each block of codes
- Plot the important intermediate results
- Write a short description for each graphical result
- Use LaTeX for mathematical comments in the notebook
- Save the notebook file as assignment04.ipynb
- Download the notebook as a PDF file assignment04.pdf

Assignment 4

github

- Start a project or a directory for the assignment04
- Include the link to the giuhub for the assignment in the notebook
- Upload the notebook assignment04.ipynb to the github after the deadline (Note that your github project is visible to public)

Assignment 4

Submission to *eclass*

- Submit the PDF file assignment04.pdf to eclass
- Deadline is 11:59 pm on next Thursday. No extension
- Score ranges from 0 to 5

Assignment 4

Score Table

- The results should be correct
- The codes should be written in a modulated way
- The comment should be made for each block of the codes
- The important intermediate results should be presented
- The link to the github project should be included

Assignment 4

Programming Assignment: k-means algorithm

- Implement a k-means algorithm for images
- Apply the k-means algorithm on MNIST dataset
- Demonstrate the k-means algorithm with varying k's
- Compute the accuracy with $k = 10$

Assignment 4

Essential Functions: k-means algorithm

- computeDistance: (a pair of images)
- initialiseLabel: (number of clusters)
- computeCentroid: (number of clusters)
- assignLabel: (number of clusters, list of distances)
- computeEnergy: (list of data, list of labels)
- computeAccuracy: (list of true labels, list of labels)

Assignment 4

Essential Visualisation: k-means algorithm

- Initial centroid images
- Final centroid images
- Energy per each iteration
- Accuracy per each iteration