Special Topic in Image Processing (Take Home Exam)
(Due date: April. 29(월), 2022, 12:00 pm)

(주의사항)

- 제출마감 시간을 반드시 지켜주세요 (마감 시간이 지난 후에는 접수 불가)
- Open Book이므로 타인과 상의하거나 타인의 내용 무단 복제등으로 인한 문제 발생시 0점 처리됩니다.
- The take home exam consists of following three questions.
- Submit the exam result to LMS system.

- Image Segmentation

While k-means and mixtures of Gaussians use a parametric form to model the probability density function being segmented, mean shift implicitly models this distribution using a smooth continuous non-parametric model. The key to mean shift is a technique for efficiently finding peaks in this high-dimensional data distribution without ever computing the complete function explicitly.

(Problem 1) Explain the basic idea of K-means Clustering algorithm and Mean Shift algorithm for image segmentation, respectively. Describe the main difference of both algorithms in addition to explain the weak and strong point of each algorithm.
Apply both algorithms to the following picture (a satellite image of Suwon area) and compare the segmentation results. (attach the segmentation results)

- Pattern Recognition/ Feature Detection (matching)

Feature detection and matching are an essential component of many computer vision applications. The concept of Feature matching is how can we extract local descriptors that are invariant to inter-image variations and yet still discriminative enough to establish correct correspondences?

(Problem 2) Selecting good features in pattern recognition is very important issue. Discuss the general ways (or methods) to select good features in developing an image classification algorithm. What types of the invariant feature in pattern recognition are used in pattern recognition? Explain the invariant features and importance of such features.

- Image Classification discussion

(Problem 3) What is the difference between parametric classification and non-parametric classification? Show one representative method of each category and explain how each method works in detail. And apply each the algorithm to above image(City of Suwon).