1. Kernelized Fuzzy C-Means

The algorithm is realized by modifying the objective function in the conventional fuzzy C-means (FCM) algorithm using a kernel-induced distance metric. Firstly, the original Euclidean distance in the FCM is replaced by a kernel-induced distance, and thus the corresponding algorithm is derived and called as the kernelized fuzzy C-means (KFCM) algorithm, which is shown to be more robust than FCM.

2. Two-Stage Multithreshold Otsu’s method

Normally, Otsu’s method (Otsu, 1979) found the optimal threshold in an image by maximizing the between-class variance of pixel intensity with an exhaustive search. However, with an increase of the number of classes in an image, this method becomes rather inefficient because it requires a large number of iterations to compute the cumulative probability (zeroth-order moment) and the mean (first-order moment) of a class. To significantly improve the deficiencies in Otsu’s method with regard to selecting the multi-level threshold, an algorithm called the TSMO method is proposed.

The idea of the TSMO method is quite simple and straightforward: to greatly reduce the iterations required for calculating the zeroth- and first-order moments of a class.

3. Support Vector Machine

*A Support Vector Machine (SVM) is a discriminative classifier formally defined by a separating hyperplane. In other words, given labeled training data (*supervised learning*), the algorithm outputs an optimal hyperplane which categorizes new examples. In two dimentional space this hyperplane is a line dividing a plane in two parts where in each class lay in either side.*