**Classwork 7**

**Assignment 1:**

**K-Nearest Neighbors (KNN)**

Implement KNN algorithm.

Use the provided data to classify the unlabeled samples using KNN algorithms.

1. Plot the samples in a different color for each type.

2. Define a function **myKNN(k, Data, NewSamples)** where k is the numbers of nearest neighbors to consider, Data is matrix of samples and labels and NewSamples is a matrix of sample without labels. The function should return the labeled samples.

3. Use the KNN algorithm to classify the NewSamples.

* Define **k** for the KNN and than for each new sample do:
* Calculate the distance between new sample to all of the labeled samples
* Find k nearest samples to the new sample
* Find the most common sample type from the k nearest samples
* Define the new sample to have the same label as the most common type

**Assignment 2:**

**K-Means**

Implement K-Means algorithm.

Use the provided data to cluster the unlabeled samples using K-Means algorithms.

1. Plot the samples.

2. Define a function **myKMeans(k, Data)** where k is the numbers of desired clusters and Data is the matrix of samples. The function should return the labeled samples.

* Define “k” centroids randomly located in the same domain as feature vectors
* Appoint each sample (feature vector) to be part of a group (cluster) represented by the closest centroid.
* Recalculate the centroids location to be the mean vector of all the samples under the specific centroid.
* Repeat steps 2 and 3 until convergence.

**Assignment 3:**

Use K-means for Image segmentation. Plot each segment separately in different subplots.