Practical Exercises for Image Processing

Exercise F

Feature Extraction:

F.1) Load "Shape1.bmp" in Matlab environment and calculate the geometrical moments of this shape for p=1,2 , q=1,2.

F.2) Shift this shape to the right for 30 pixels and calculate the geometrical moments of the shifted shape for p=1,2 , q=1,2. Are they different from the moments you calculated in F.1? why?

F.3) Calculate the centralized moments for Shape1 and its shifted version for p=1,2 , q=1,2. Are the centralized moments for Shape1 and its shifted version different? Why?

F.4) Rotate Shape1 by 90 degrees and calculate the geometrical and centralized moments of Shape1 before and after the rotation. Are the moments before and after rotation different? Why?

F.5) Calculate invariant moments M1 and M2 for Shape1 before and after the rotation. Are the invariant moments before and after the rotation different? Why?

F.6) Calculate invariant moments M1 and M2 for Shape2 and Shape1. Are M1 and M2 moments different for these two shapes? Why?

Classification and Clustering:

F.7) load data1 into Matlab environment and display the data by using "plot" command. Then by using the K-means clustering algorithm ("kmeans" command in matlab), cluster the data into 2, 3 and 4 groups and display the clustered data with their centres in different colours.

F.8) Use the centres of each cluster as training data and classify the above data by using KNN algorithm for k=1, 2 and 3 and display the classified data in different colours. Do the results change when k is changed? Why?

F.9) By using a Leave-One-Out strategy, measure the accuracy of the KNN classifier for k-1,2 and 3. In this exercise, the clusters (instead of their centres) should be used as the training data.