Abdullah Mohammed

Yoseph Sadat

**PS2**

1. The mean shift grouping algorithm would be the most appropriate to recover the model parameter hypothesis from the continuous vote space. This is due to the fact that the mean shift algorithm finds the features and then groups them to their average values by initializing a range around the specific feature and continuously shifting until it converges at the peak. If the mean shift is applied the vote space would not be discretized therefore making it the most optimal. A downside to the k-means approach is that since we initialize the cluster centers in this process, the vote space is discretized and would not result in an accurate value when run when dealing with a continuous amount of points. The k-mean approach would be sensitive to the initial clusters and attempt to minimize the Euclidian distance between the points resulting in an inefficient solution. Finally, a downside to the graph cuts approach is that it breaks the graph into segments but when dealing with a continuous amount of points this approach would not work since it wouldn’t be able to assign every pixel.
2. From the question we know there will be two clusters which will be randomly assigned at first. After the clusters are assigned, they move to minimize the mean Euclidian distance. From observing the image, we can see the k-means algorithm will run until the two clusters each contain half of the points in the graph. This is due to the fact that as stated earlier, the k-means approach seeks to minimize the Euclidian distance within the cluster and moving until each cluster contains half the points is the logical approach if the clusters are initially randomly placed.
3. When given multiple blobs with connected components in a binary image, the pseudo code for the blobs would be a K means approach as seen below:

Variables:

k = specified number of k groups

c values = cluster centers

i = iterator

1. Initialize k number of points randomly on a graph, these will be the cluster centers(ci…ck)
2. For each point on the graph find the closest cluster (ci) center and put the point into cluster i
3. Set ci to be mean of points in cluster I
4. If the ci changes repeat step 2 again
5. Once ci is no longer changing blobs have been identified and their centers are ci…ck