CSE 573 Assignment 2 – Report

Problem 1: Foreground-background texture-based segmentation via clustering

Solution:

e) (i)

a) Read the animal image (say Cheetah.jpg) and get the intensity matrix (I_m).
b) Call segmentImg() with parameters I_m calculated above and the K value for K-means.
c) Get the double value intensity matrix I_m after converting after converting the image from color to gray.
d) Get size of the I_m (m x n) to initialize data matrix X of the dimension (mn x number_of_filters).
e) Now start a loop which will run the number of times equal to the number of filters.
f) Inside this loop we will convolve our input image with each of these filters and save the responses by taking the absolute values only.
g) Reshape the response and transfer into num_filters-dimensional vector.
h) Now after the loop finishes call k-means on X and the K value which gives IDX as the result.
i) Reshape the IDX back in the dimensions of Im.
j) Now finally call transferImg method to transfer the segmented image on the other background.

Limitations:

a) Trying out with different values of k for k-means to get the proper segmentation.
b) Clusters consist of the object borders which may include some other regions inside the objects resulting in holes in the objects.
c) If clustering is not proper (based on k), it will be difficult to separate the objects in the data set.
d) We have to run the process many times because Local Optima in k-means can disturb the results.

e) (ii) Not implemented k-means

e) (iii) Original and final images

Animal 1	Segmented and transferred Image (**K=2**)

Animal 2	Segmented and transferred Image (**K=2**)

e) (iv) Reason for holes in the image:

Basically clusters consist of the object borders which may include some other regions inside the objects resulting in holes in the objects of the binary image obtained in K-means clustering.

For example if we closely examine the below given images then we can see that the face of Cheetah in the original image has some very small and comparatively less dark dots around the face (Red colored space). Which may be the reason of having holes in the final image of the Cheetah.

We can fill up the holes using the neighboring pixels and calculating SSD by considering a window for any size –n to n. Better results can be obtained by giving more weights to the nearby pixels as compared to the distant ones.