

**ECE/OPTI 533 Digital Image Processing
Homework 8**

Spring Semester, 2003

Due in ECE main office (Curt Booth) before 3PM, April 22, 2003

1.a. Write a basic K-means clustering program, with no merging or splitting, using the nearest-Euclidean distance $\sqrt{D1^2 + D2^2 + D3^2 + D4^2}$. The program should produce a cluster map the same size as the input image, with the DN assignments 1=cluster 1, 2=cluster 2, etc.

Apply the program to the 4-D data “band1”, “band2”, “band3” and “band4” on the class website. These are each of the size:

512byte header + 1 sample x 150 lines x 32bits/pixel

in the same format as the other class images.

Find the resulting cluster means for K=3 and 10 iterations. (60%)

b. Change the seed mean values, and repeat part (a) for the same number of iterations. (10%)

c. Plot the *mean cluster migration distance* and *number of pixels that change cluster assignment* versus iteration number for part (a). (20%)

2. Modify the program to use the “city-block” distance, i.e. $|D1|+|D2|+|D3|+|D4|$ and find the cluster means again using the same seed mean values as in part (a). (10%)

The following text contains the 4-D data for this assignment. You can use this to verify your files, or import this text directly into your program.

band 1

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band 2

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band 3

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band 4

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