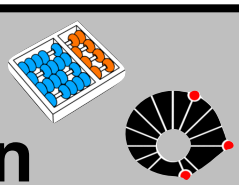
MO446A/MC959A
Intro Computer Vision



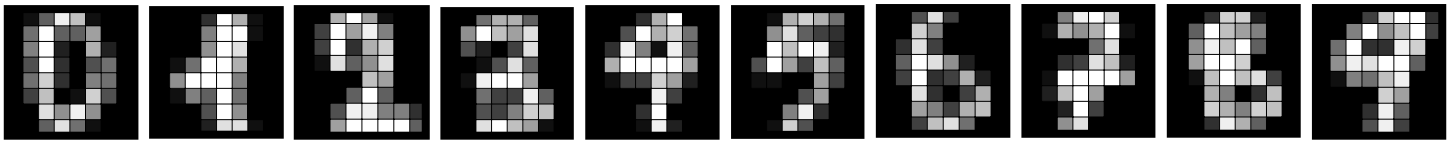
Prof. Siome Goldenstein
Mon-Wed - 8:00-9:40am
@IC351
Office hours on Demand

Problem Set 02 - Clustering (GRP, IS)

Assignment: 22/04/15@23:59 - Peer Grading: 29/04/15@23:59 .

Python, OpenCV and K-Means

In this assignment, use python and OpenCV. Grab the dataset (file `digits.raw`) from the assignment page on the course Moodle. Each line of the file is a data element – 64 integers ([0-16] range) separated by commas that represents an 8x8 matrix, or image snippet, of a manuscript digit:



Question 1

Using python and OpenCV, learn how to read the data.

Question 2

Write a function that receives to parameters, a data element and a size k, which returns an image with resolution kxk that represent the grayscale digit (like the snippets above).

Question 3

Use OpenCV's KMeans implementation to explore and cluster the dataset in 10 groups.

a) Use the function of Question 2 to draw the centroid of every cluster
b) Analyze the algorithm's sensitivity according to changes in the initial seeds.

Question 4

Calculate the Covariance Matrix of each of the groups.

Question 5

For each group, calculate the Mahalanobis distance of every element to the centroid, then draw the centroid followed by the three farthest elements (showing their Mahalanobis distance).