CSE 4422.03
Lab Assignment II.

Due Date: July 28

1. Adaptive Thresholding

Write a program that takes an image and fits, in a least square sense, a plane on the grayscale of the image. In other words

$$I^t[i, j] = \alpha_0 + \alpha_{10} i + \alpha_{01} j$$

where the parameters α are estimated by minimizing

$$\sum_{i,j} (\alpha_0 + \alpha_{10} i + \alpha_{01} j - I[i, j])^2.$$

Use this fitted image I^t to threshold a continuous stream of images and display the results. To show the advantage of the method your program should be able to switch to a simpler thresholding where the threshold is just the average image intensity. For the demo choose your images so that the advantage of the method is shown.

2. Point matching

Continue Assgn. I so that you take into account the variance covariance matrix. To do this define two functions `CovInd()` and `CovDep()` that accept as arguments the "image", its derivatives in the two directions and the variances of the various components. If we are matching, for example 7x7 patches, the "image" is a 49x1 vector. Similarly for the derivatives. The result is a 49x49 covariance matrix. Using the sum of these covariance matrices, compute the Mahalanobis distance. For every point the user clicks show the matching point and print out the Mahalanobis distance.