DataSet

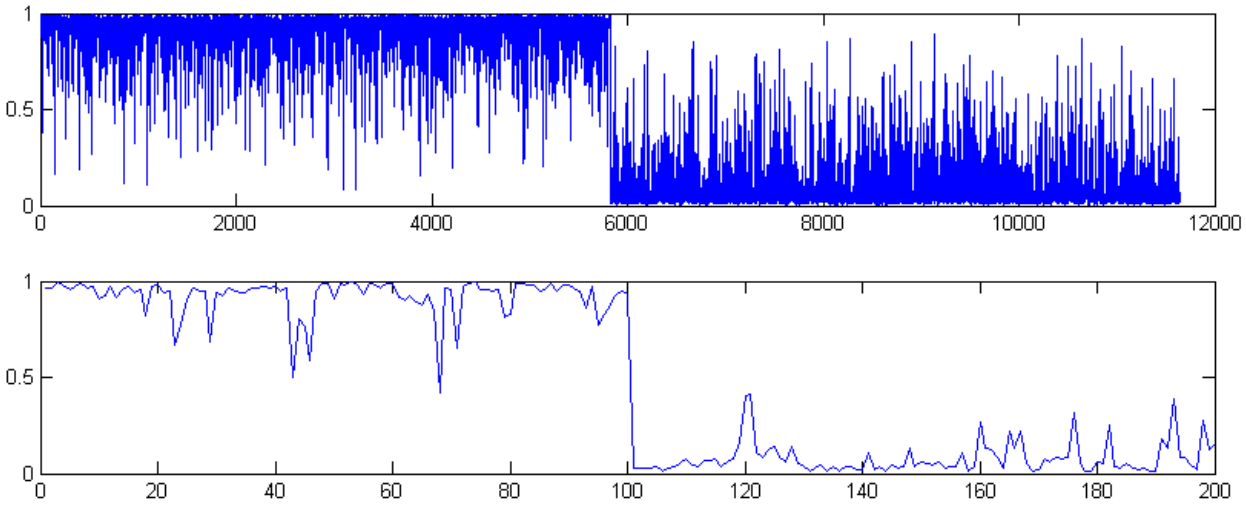
Name: MNIST handwritten digits http://yann.lecun.com/exdb/mnist/

I used 5923+5918 images (5923 ‘0’ and 5918 ‘6’)

Regularized Logistic Regression

The linear mapping

Class probabilities for training and test images, p(digit=0|x)



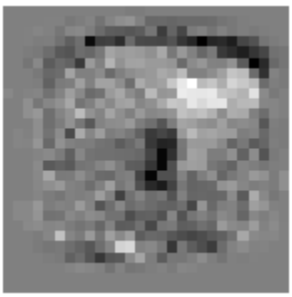
Classification accuracy:

Training data: digit ‘0’ (5735/5823) digit ‘6’ (5701/5818)

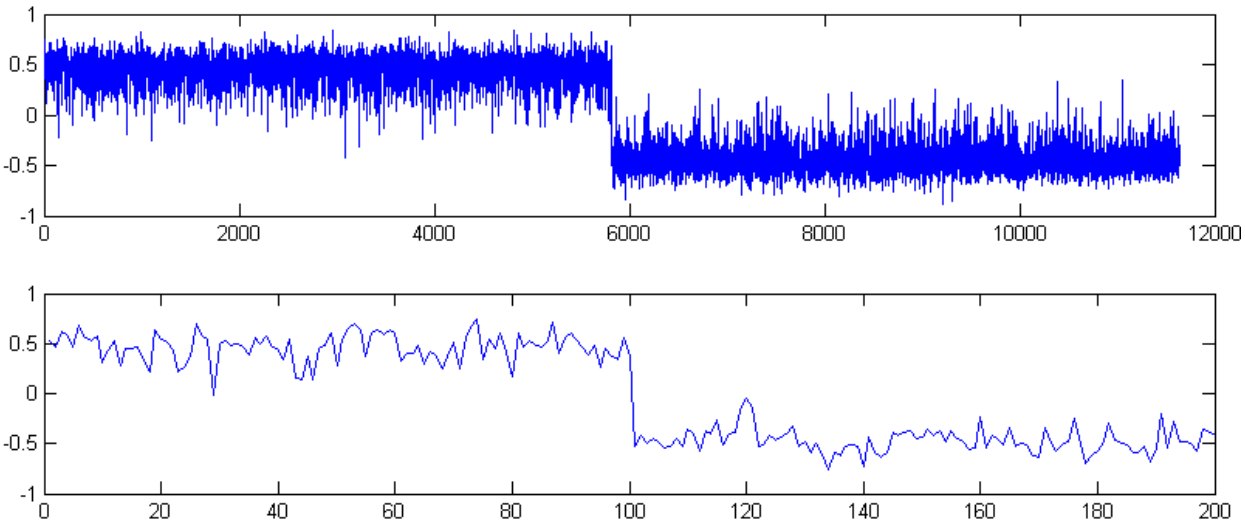
Test data: digit ‘0’ (99/100) digit ‘6’ (100/100)

Least Squares Classification

The linear mapping



The coefficients for training and test images



Classification accuracy:

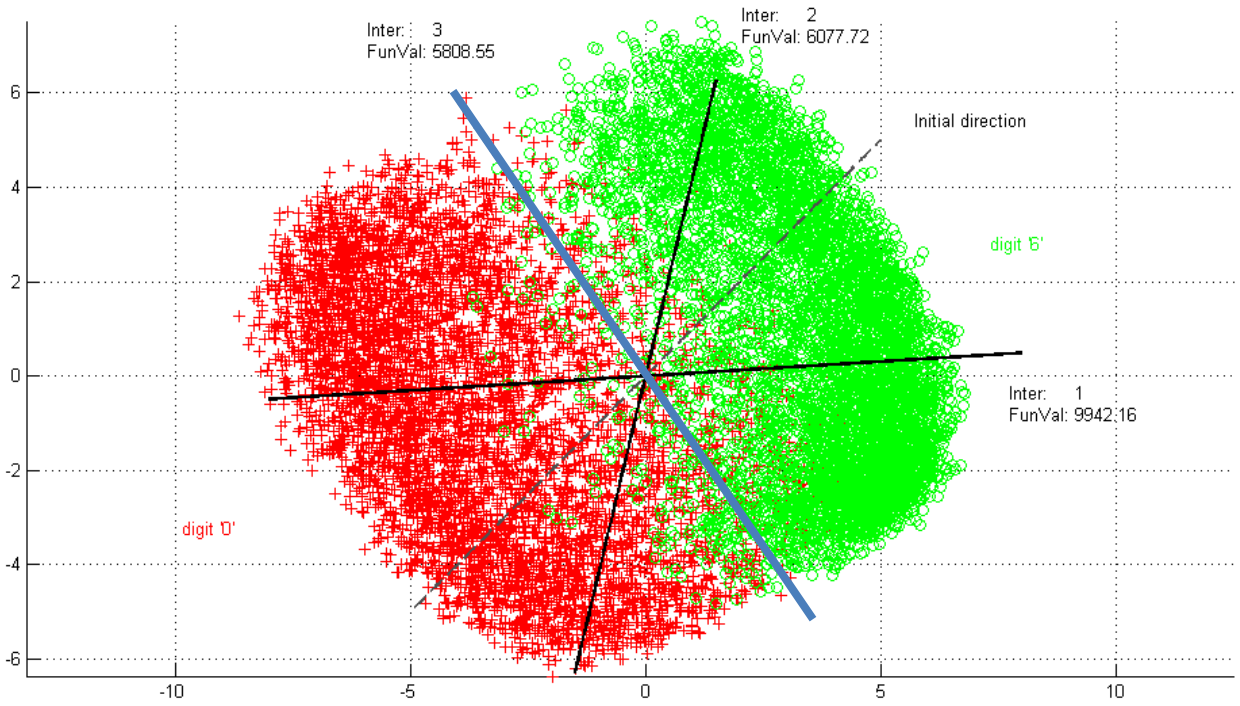
Training data: digit ‘0’ (5777/5823) digit ‘6’ (5767/5818)

Test data: digit ‘0’ (99/100) digit ‘6’ (100/100)

Comparison of Regularized LR and LSC

Apply PCA (k=2), and learn Regularized LR and LSC classifiers using Steepest Descent.

Regularized LR



Least-squares Classifier