Machine Learning HW
NCC, Perceptrons
Will be discussed on in Class

1. Download the USPS data set from the Moodle Page together with the two skeleton python files, named `HW2_NCC_stub.ipynb` and `HW2_Perc_stub.ipynb`

2. Nearest Centroid Classifiers

   a) Program an iteratively trained nearest centroid classifier (NCC) that classifies the digit **0** against all others

   b) Train the NCC on 70% of the entire data set

   c) In each iteration of the training phase store the prediction accuracy on the remaining 30% of the data (the test data set)

   d) The NCC function should return the accuracy on the test data and the weight vector

   e) Plot the accuracy as a function of iterations and plot the centroid of the digit **0** as an image

3. Linear Perceptrons

   a) Program a linear perceptron that classifies the digit **0** against all others

   b) Train the perceptron on 70% of the entire data set

   c) In each iteration of the training phase store the prediction accuracy on the remaining 30% of the data (the test data set)

   d) The perceptron function should return the accuracy on the test data and the weight vector

   e) Plot the accuracy as a function of iterations and plot the weight vector as an image, as in Figure 1
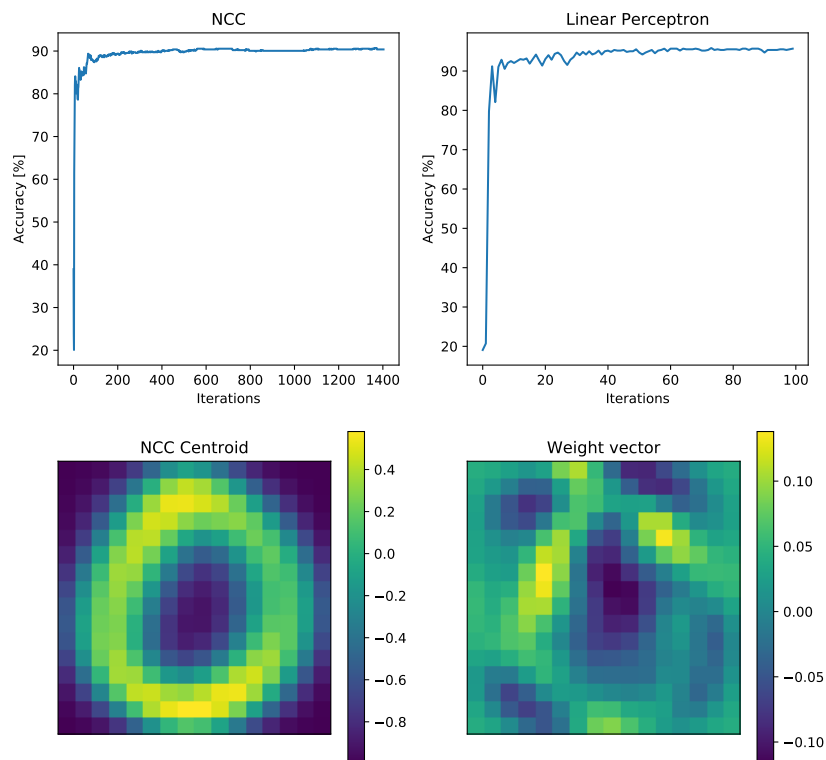
Figure 1: *Left*: Classification accuracy as function of iterations. *Right*: Weight vector for digit 3 plotted as image