Introduction to Machine Learning, Fall 2014 - Exercise session III

Rodion "rodde" Efremov
013593012

November 9, 2014

Problem 1 (3 points)

Problem 2 (3 points)

Problem 3 (3 points)

Problem 4 (15 points)

In this exercise we implement an extremely simple prototype-based classifier to classify handwritten digits from the MNIST dataset, and compare that to a nearest-neighbor classifier.

(a) Download the MNIST data from the course web page. In addition to the actual data, the package contains some functions for easily loading the data into Matlab/Octave/R and for displaying digits. See the README files for details. Load the first $N = 5,000$ images using the provided function.

First we need to get to the directory containing the `loadmnist.m` file, run it, and load 5000 images along their class labels.

```
cd /path/to/mnist
run('loadmnist.m');
[X y] = loadmnist(5000);
```

Now the matrix X contains an image at each row (`X(i,:)` is an ith image).

(b) As to verify the data, we need a randomly selected array of indices:

```
indices = randperm(5000, 100);
```

After that we can draw the digits from the actual data and compare them to the actual labels:

```
visual(X(indices,:));
y(indices) # Prints the actual labels.
           # Appeared to be in accord with the drawn digits.
```