The aim of this project is to give you the feeling for a realistic application of artificial neural networks. The goal is to learn to recognize hand written digits.

1. Obtain the data sets: Processed images of digits are found at:

2. Read “optdigits.names” file to understand how the characters are described.

3. Use the training data “optdigits.tra” for training and test data “optdigits.tes” to test your classifier and measure error.

4. Write a program which implements the back propagation method as discussed in the lectures. 
   Some hints:
   i. The learning rate must be small (e.g. 0.0001). Use only one hidden layer.
   ii. Choose a high number of neurons in the hidden layer (e.g. 20).
   iii. Run your algorithm several times (e.g. 10 times) with different initializations.
   iv. Think of a good criterion for stopping your algorithm. Typically, the algorithm can be halted when a convergence is detected in the learning error. Fixing the number of iterations is certainly not a good criterion.
   v. Often the learning error approaches a plateau before it finally falls further. If you stop too early, you miss the further improvement.

5. Measure the performance on the test set.

6. Write a short report (2 - 3 pages maximum) that describes the network structure, error graph, and results.