Neural Networks
Final Exam – 3.2.2016.

1. Deep neural networks

1. Draw the general architecture of convolutional neural networks.

2. What is the role of pooling layers in convolutional neural networks?

3. What is the role of convolutional layers in convolutional neural networks?

4. Explain the structure of autoencoders.

5. Explain the contrastive divergence algorithm.

2. Genetic algorithms

1. Explain the motivation behind genetic algorithms.

2. What is the role of mutation in genetic algorithms?

3. What is the role of selection in genetic algorithms?

4. Explain a few types of selection procedures.

3. Boosting

1. Define a weak classifier.

2. Explain the idea behind boosting.(Motivation, how does it function, advantages and disadvantages)

3. Write the AdaBoost algorithm pseudocode.

4. Can AdaBoost be used for linearly non-separable problems? Why?

4. Recurrent networks and self organizing networks

1. Draw the architecture of a recurrent network.

2. Explain the Principal Component Algorithm (PCA).

5. Learning

1. Draw the singe layer perceptron block diagram.

2. Explain three main activation functions.

3. Explain the delta rule.

4. Training set is given $T = \{(x_i, d_i), i = 1...N\}$ where x_i is the feature vector, and d_i is name of the class.
$T = \{([0, 2], 1), ([2, 0], 1), ([4, 0], 0)\}$. Adjust the weights using the delta rule for first two examples and calculate the error for the third example. Assume a step activation function and learning rate of $\eta = 0.1$.

5. Define a linearly non-separable problem. Write an example of a linearly non-separable problem.