

EE 456 Mini-Project #1

The project requirements are intended to be focused to permit you to be successful in executing the project within a fortnight. This problem is designed to:

1. Demonstrate that the MLP trained using the backpropagation algorithm is capable of classifying nonlinearly separable data.
2. Explore a more difficult case where even the MLP with backprop may struggle to differentiate the classes for similarly structured data.

The MLP you implement should be structured as follows:

- Input layer = 2 neurons
- Hidden layer = 20 neurons
- Output layer = 1 neuron
- Activation function = hyperbolic tangent function
- Threshold setting = 0
- Learning rate, η : annealed linearly from 10^{-1} down to 10^{-5}

Deliverables:

1. For each data set:
 - a. Plot of Training error and Validation error vs. Number of epochs (i.e., on the same plot).
 - b. Plot of the test data (that is, do not plot the data used for training) showing the two regions and the determined decision boundary.
 - c. Report the overall error rate.
2. Code developed to implement the MLP with backprop.
3. Training data and test data for each of the two data sets. Make sure each data set is labeled appropriately, differentiating training or test and data set 1 or 2. The test data should match what is shown in the plots in Deliverable #2.

Your written report should consist of the following:

1. Cover page with course name, number, date, and your name and names of all project team members.
2. An overview of the mini-project.
3. A write-up discussing your implementation and any details necessary to understand the design decisions that you made, heuristics you implemented, with illustrations if necessary.
4. A "Results" section presenting the deliverables and an evaluation of the results with any observations you made based upon the project, results, and or analysis of the same.