

**Lab #6: Multilayer Perceptrons**

Due: 5/20/2011 11:59 PM

In this programming lab, you will implement the back-propagation algorithm for neural networks. The given dataset contains 300 instances of 8 x 8 pixel images for block letters “E”, “L”, and “F” (100 instances for each letter). Note that those pixel images are perturbed by some random noise.

**You will work on the following two tasks in this lab:**

- 1) Assume a 64 (input nodes) – 2 (hidden nodes) – 3(output nodes) neural network for the classification. Fill in the function body of **bp** to implement the back-propagation algorithm. Your function should return a list of weight vectors. Note that bias nodes should be included at each layer.
- 2) Analyze what the two hidden nodes represent. If you execute the function **grading** in lab6.R file, two images will be shown up (if your implementation of the function **bp** is correct). Each shows an 8 x 8 pixel image where each pixel value is the weight on the connection from the corresponding input node. If you analyze those two images, you will easily find out the solution. Write your analysis on the bottom of lab6.R file.

If your result is different from the solution, TAs will go through your code to give you a partial credit. If your code is not legible, TAs will grade your homework according to the value returned by the function **err**. And submit runnable code. Before you submit your code, please try to rerun it after restarting R or removing everything in your current workspace. It will help TAs to grade your code.

**Submission Format**

#ID\_FIRSTNAME\_LASTNAME\_lab6.R

For example, 20110101\_Ethem\_Alpaydin\_lab6.R

