Assignment #7, 24 Oct 2014

Computer Problem: Self Organizing Maps Unsupervised Learning
Due: Thursday 13 by midnight November 2014.

Submit the report electronically in PDF form. Submit your code as well.

a) Using your own code and data structures, implement a simulation of
an SOM neural network and learning algorithm. Set up a two input and
M x M output layer network topology. Implement the SOM learning
algorithms described in the text and the lectures. Use the same
training sets from Assignment#5 (Back prop) except DISREGARD THE
DESIRED VALUES: combine the four training and testing classes into one
large set 1600 in number. This is an unsupervised learning system and
has no desired output.

b) Train the network to convergence on the total combined training and
testing data, randomly drawing from it with replacement. Define your
version of a convergence test. Explore the learning properties of this
network by varying all of the parameters at least 5 times each: eta,
sigma0, tau, M. Show how convergence changes with different random
presentation orders of the training data. Note: there are no epochs in
this learning algorithm since the training patterns are draw with
replacement from the training list. Define N to be to total number of
drawings.

c) Produce plots showing stages of convergence of the combinations of
parameters for at least 10 interesting cases of convergence. Plots
should include weight maps showing the topology, and weight convergence
plots showing the magnitude of the weight changes verses presentation
number.