EE 550 Artificial Neural Networks - Homework 4

Due 24/04/2018

1) Implementation of Winner Take-all Network

- **a.** Generate a 3-D dataset randomly by placing 3 clusters of input data on a unit sphere. There should be 75 sample points. (Choose 3 regions on the unit sphere and randomly place 25 sample points on on these regions)
- **b.** Plot the sample vectors, each class with a different sign, on the unit sphere.
- **c.** Start with random weight vectors (unit length) for each category. Each weight vector (for 3 output categories) is represented with a cross sign (x) on the unit sphere. These vectors should be normalized to unit length.
- **d.** Implement the learning algorithm for winner take-all network, for a network with 3 inputs and 3 outputs. (Start with random weight vector, find the winner i^* for each $\zeta^{\mu}, \mu = 1, \dots, 75$, update the corresponding weight vector) Record the data for each output's weight vector as it is being updated. Plot the trajectory for each output's weight vector on the unit sphere.
- **e.** Test your model with 6 samples from your dataset. (6 samples - 2 from each cluster)

For submission of your homework, use Moodle system to upload all of your matlab codes (or any other programming language) and reports in a single compressed file including your name and homework number (HwX_LastName_FirstName). Also, make sure each file in the compressed one is named using your fullname and question number (i.e. FirstName LastNameEE550hw1Q1.m).