Spring 2018: CSCI 6990 Programming Assignment #2

DUE: Wednesday, April 11, 2018 (**Softcopy** @11am; **Hardcopy**@2pm/in class).

Instructions

❑ All work must be your own (other than the instructor provided codes and hints to be used). You are NOT to work in teams on this assignment.

❑ Format: Your solution must be typed. Submit as a single compressed file (via moodle) **containing all the related files in it**. Name it as PA2_<Your_name>. Provide hardcopy (see <u>Reporting</u> section.)

❑ The top/cover page of the report should have the title, "Spr 2018: CSCI 6990, ML-II Programming Assignment #2". Then your, "Name:_____ and ID:_____

❑ Total marks = **100** + Bonus (**20**) = **120**.

PART (A)
<u>Description</u>

This programming assignment is to build several Artificial Neural Networks (ANNs) to recognize one of the 03 (three) classes of flowers based on given 04 attributes or features of the flowers. The details are:

- You will build 05 different ANNs having hidden layer(s): 1, 3, 5, 6 and 7.
- Each of the hidden layer will have random units ranging from 2 to 20.
- You are welcome to generate any additional useful features from the given datasets to be used as input feature.
- Train your ANN(s) using the training datasets using 10 fold cross validations (10 FCVs).
- Exit condition for the ANN is reach at least 2000 epochs, or, to obtain mean-squared-error (MSE) of 0.05 or less.
- **Bonus (20)**: If you implement regularized ANN for all cases and you also explain the implementation of the regularized ANN in your report then you can get as much as 20 bonus marks.

Data

Full description of problem including data set is available here:
- o https://archive.ics.uci.edu/ml/datasets/Iris
- Input 04 features are:
    - o Sepal length in cm
    - o Sepal width in cm
    - o Petal length in cm
    - o Petal width in cm
- Output 03 classes are:
    - o Iris Setosa
    - o Iris Versicolour
    - o Iris Virginica

- Check moodle for a copy of the datasets and related information.
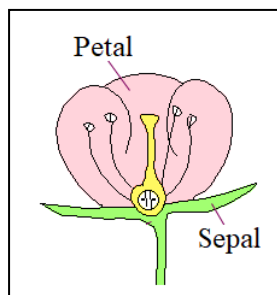
Reporting
(<u>Submit softcopy and provide hard-copy in class</u>**)**

- Submit a report that includes:
    - o Describe the design(s) of your 05 different ANNs.
    - o In tables show, 10 *minimum* test-error (i.e., MSE error) collected from 10 FCV and their average for each of the ANNs.
    - o For each of the ANNs, plot graphs of train and test
        - ▪ (a) average MSE error-rate and
        - ▪ (b) average classification error-rate,
        for epoch-range from 1 to 200.
    - o Program code with necessary comments.
- A readme file describing how to run your program.

Information

- Check lecture note of chapter #04, to review the existing ideas and results.
- **You must follow the ANN code provided by the instructor in the class**. Extend the code for this assignment problem (You may convert the given code or idea of the code to a different programming language and then you can extend it further).

PART (B)

Declaration

Inside the PA2_<Your_name_id>.zip, you must submit a single paged document declaring that the submitted work is **<u>completely yours and you have not either partially or fully copies someone else's assignments directly or indirectly</u>**.

Without the declaration being submitted, the assignment will **NOT** be graded and the default score will be '0' (zero).

---- X ----