# Artificial Neural Networks

## GARDENS OF HEAVEN (100 Points)

A gardener of the Gardens of Heaven is given the task to straighten up a mess that has happened the day before. A prankster (no one knows if a customer or an employee) mixed up all the Iris plants in the nursery and removed all the tags from the pots. There were three benches in the greenhouse. On each bench, a type of Iris: **Iris Setosa**, **Iris Versicolour**, and **Iris Virginica**.

Your job is to help the gardener to classify all the pots with the help of a multi-layer neural network. Your program will have two functionalities: train the ANN, and classify the plants based on user input. During classification, the gardener will be asked to provide all the necessary information and respond with a predicted class of Iris.

To train the ANN, you will use the Fisher's Iris database (Fisher, 1936). This database is perhaps the best-known database to be found in the pattern recognition literature. The data set contains 3 classes of 50 instances each, where each class refers to a type of Iris plant. One class is linearly separable from the other two; the latter are not linearly separable from each other.

The data base contains the following attributes:

1) Sepal length in cm
2) Sepal width in cm
3) Petal length in cm
4) Petal width in cm
5) Class:
    a. Iris Setosa
    b. Iris Versicolour
    c. Iris Virginica

The database is available in Canvas assignment page. It must be loaded by your ANN for training and validation purposes. The testing part of this assignment will output the accuracy calculated using few instances of the data set. In addition, your program should allow the manual input of the attributes to simulate any gardener's query.

## SUBMISSION

Python or C++ are the preferred implementation languages. If you are writing in C++, please include a Makefile as well as any other instructions for compilation. For Python, simply provide a plain PY file (no Jupyter notebook).

Your solution may make use of any numerical libraries for pre-processing, fundamental calculations (i.e., linear algebra) and visualization. However, the core portion of your solution must be implemented from scratch.

Submit your solution via Canvas and include a README file that clearly explains its assumptions.