

Artificial Neural Networks

GARDENS OF HEAVEN (100 Points)

A gardener of the Gardens of Heaven is tasked with straightening up a mess that 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. There is a type of Iris on each bench: **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 database 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 on the Canvas assignment page. Your ANN must load it for training and validation purposes. The testing part of this assignment will output the accuracy calculated using a 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

Your solution may use external libraries for pre-processing, fundamental calculations (e.g., linear algebra), and visualization. However, you must implement the core portion of your solution from scratch.

Python or C++ are the preferred implementation languages. If you are writing in C++, along with your source code, please include the main CMake file as well as any other instructions needed to compile the executable. For Python, provide only plain PY files (no Jupyter Notebook or PYC cache files).

Submit a single ZIP file via Canvas that includes all the source files and a README clearly explaining your solution's assumptions.