CSAL4243 – Assignment 3

You can use any programming language to perform the experiments. The programs should be developed considering discussions during the lectures.

Description:

The Thyroid experiment.
The dataset for the experiment is available as example in Matlab. You can export it to CSV or MS Excel format if required.
The dataset consists of 7,200 patients represented as 21 features. Experts have classified the samples into normal, hyperfunction or subnormal.

Task 1:

Create a pattern recognition neural network with one hidden layer of 20 neurons. The output should be classification of features into one of the three classes. You should save the performance evaluation (confusion matrix, accuracy) along with the trained network. This network shall be considered as a baseline for further experiments and we shall refer to it as ***Model_1*** in further experiments. Use default learning and loss functions.

Task 2:

Modify the program from Task 1 so that it incrementally changes the number of neurons in the hidden layer from 1..200 and compare the performance against **Model_1**. This will allow us to observe the effect of changing size of hidden layer within the architecture of the neural network.
At the end of the program, you should display results from the best performing architecture – performance accuracy, and save it for later use.

Task 3:

Modify the program from Task 2 so that it has 2 hidden layers. Then, incrementally change the number of neurons in the both the hidden layers from 1..50 (using all possible combinations) and compare the performance against **Model_1**. Also, apply 10-fold cross-validation to ensure robustness.
This experiment will allow us to observe the effect of changing number and sizes of hidden layers within the architecture of the neural network.
At the end of the program, you should display results from the best performing architecture – performance accuracy, and save it for later use.

Task 4:

Modify the program from Task 1 so that uses different learning functions while using only 20 neurons in one hidden layer and compare the performance against **Model_1**.
This will allow us to observe the effect of changing learning functions within the architecture of the neural network.
At the end of the program, you should display the results from the best performing architecture – performance accuracy, and save it for later use.