MACHINE INTELLIGENCE AND EXPERT SYSTEMS

AUTUMN SEMESTER - 2020

COMPUTER-BASED ASSIGNMENT-5 (Neural Network)

1. Train a neural network for classification of Fisher's Iris data (refer 'IRIS_TrainData.csv') to predict the species of Iris flower. It has three classes 'Iris-setosa' and 'Iris-versicolor' and Iris-virginica. The dataset contains four features for each sample: sepal length, sepal width, petal length and petal width.

- Design a neural network with the following parameters:
  - No. of nodes in the input layer: 4
  - No. of hidden layers: 1
  - No. of nodes in the hidden layer: 3
  - No. of output nodes: 3
  - Sigmoid activation function for both hidden layer and output layer

    Sigmoid function is given as, $S(x) = \frac{1}{1+e^{-x}}$
  - Learning rate: 0.15
  - Cost function: $\frac{1}{2}\sum_k (t_k - o_k)^2$, where o_k is calculated output and t_k is the target output.

  Implement neural network with functions for forward propagation, error calculation, back propagation and weight update.

(Do not use in-built functions or toolboxes for forward propagation, gradient calculation and back propagation)

After training, classify the following samples:

[4.6 3.5 1.8 0.2]

[5.9 2.5 1.6 1.6]

[5 4.2 3.7 0.3]

[5.7 4 4.2 1.2]

(Note: Do not forget to normalize the data)

- Cost vs epoch for the training data using the Neural Network classifier built.
- Plot to visualise the input values before and after normalisation of training data.
- Predicted output values and the species associated for the test data.
- Calculate the accuracy for the test and training data for different values of epoch.