

MACHINE INTELLIGENCE AND EXPERT SYSTEMS

COMPUTER-BASED ASSIGNMENT (Neural Network)

1. Train a neural network for classification of Sea snail data (refer 'Snail.csv') to predict the gender of the sea snail. It has three classes 'Male(M)', 'Female(F)' and 'Both(I)'. The dataset contains eight features for each sample: Length, Diameter, Height, Whole-weight, Shucked-weight, Viscera weight, Shell-weight, rings.
2. Design a neural network with the following parameters:
 - No. of hidden layers: 1 (with maximum up to 8 nodes)
 - Sigmoid activation function for both hidden layer and output layer
Sigmoid function is given as, $S(x) = \frac{1}{1+e^{-x}}$
 - Learning rate: 0.01
 - 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.
3. Implement neural network with functions for forward propagation, error calculation, back propagation and weight update up to 500 iterations.

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

4. After training, classify the following samples:

[100 50 20 55.5 42 23 35 11]

[110 74 25 153.6 47.4 15.5 11 10]

[106 73 16 70.3 47.4 29.9 33 19]

[94 81 20 132.9 33.5 34.2 38 10]

(Note: Do not forget to normalize the data)

5. Plot the following
 - 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 gender associated for the test data.
 - Calculate the accuracy for the test and training data for different values of epoch.