

Q.1. Implement a back propagation neural network with one input layer, one hidden layer, and one output layer in Python programming language. You are allowed to use only the NumPy library. No other library functions are allowed for the implementation.

Make your implementation flexible so that the user will input the learning rate, the number of neurons in the input, and the output layer. Number of hidden layers will be one of the following (taken as user input). The initial weights would be assigned with random numbers.

Train the model for 1000 epochs with the "**Boston Housing**" dataset test on the same, and report the accuracy/loss for the following cases.

- (a) Number of neurons in hidden layer = 3, learning rate = 0.01
- (b) Number of neurons in hidden layer = 4, learning rate = 0.001
- (c) Number of neurons in hidden layer = 5, learning rate = 0.0001

Use five and ten-fold cross validation for this purpose. Create a folder with name P4_<YourRoll>. Copy your code and all your supporting files including one README file on how to execute the code. ZIP the folder and upload in the Moodle server within the deadline.

Note: For data handling Pandas and other standard libraries can be used.