

Assignment 3

In the Previous Assignment you worked on a kaggle dataset to predict the Relative Humidity using 13 Air Quality Factors. The methods you used in the previous assignment were based on Linear Regression and Normal Equations. However, to use the Linear Regression Method we had assumed that the dependence of Relative Humidity on the 13 Air Quality Factors was simply Linear. However that may not be the case everytime. To increase the efficiency of our Model we will have to use more advanced methods of Machine Learning which you all will do in this assignment.

1. You have the knowledge of Neural Networks and their implementation from scratch as explained in class. However it might be difficult to implement Neural Networks from scratch everytime we change the architecture of our Neural Network. Hence we have Python Libraries such as Tensorflow and Keras developed which allow us to implement Neural Networks easily. Your first Task for this assignment is to study the documentation of TensorFlow and Keras and How can it be implemented to make Neural Networks Architectures to build models. The Reference Links are given below:

- a. <https://www.tensorflow.org/tutorials/keras/regression>
- b. https://www.tensorflow.org/tutorials/keras/overfit_and_underfit

2. Now that you know the basics of TensorFlow and Keras you can build a simple Neural Network and everytime change the Number of Layers and the Number of Neurons/Nodes In each layer. Hence your next task would be to load the same kaggle dataset as given in Assignment 2 (Air Quality Dataset) and try to make a Neural Network Model using the TensorFlow Library. When you make the model, also note how the loss function decreases while training continues. Try obtaining the best Neural Network Model with the lowest Test Set Error by changing the number of layers and neurons in each layer and training the model every time with a new architecture of the Neural Network.

Train at least 5 different Neural Network Models everytime with a different architecture(i.e. different number of layers and nodes in each layer) and Note down the Test Set Error in each case. The Model with the Lowest Test Set Error would be the best Neural Network Model for our prediction.

Train Set : 80% of the Dataset

Test Set : 20% of the Dataset

Train Set and Test Set errors would be the same as described in previous assignments.

Deadline : 5 Feb 2023

Mode of Submission : Through Github Repository. You need to submit a Jupyter Notebook containing each of the Five Neural Network Models and the Test Set Error in each case.

Note that This Final Assignment is compulsory for Ratification of the Project. Failing to submit this Assignment on Time will lead to Deratification from the Project.