Assignment no :1

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Course: COMP5421 Deep Learning
Topic: The BP algorithm to train a multi-layer network.

How to use the BP algorithm to train a multi-layer network:

Discussing about the backpropagation algorithm which is a supervised learning technique used to train artificial neural networks.In other words ,it is basically utilized in multi-layer neural networks along with it also changes the network's weights and biases to minimize the error between the expected and actual output.In this given code,i have used the BP technique to train a three-layer network with one hidden layer.

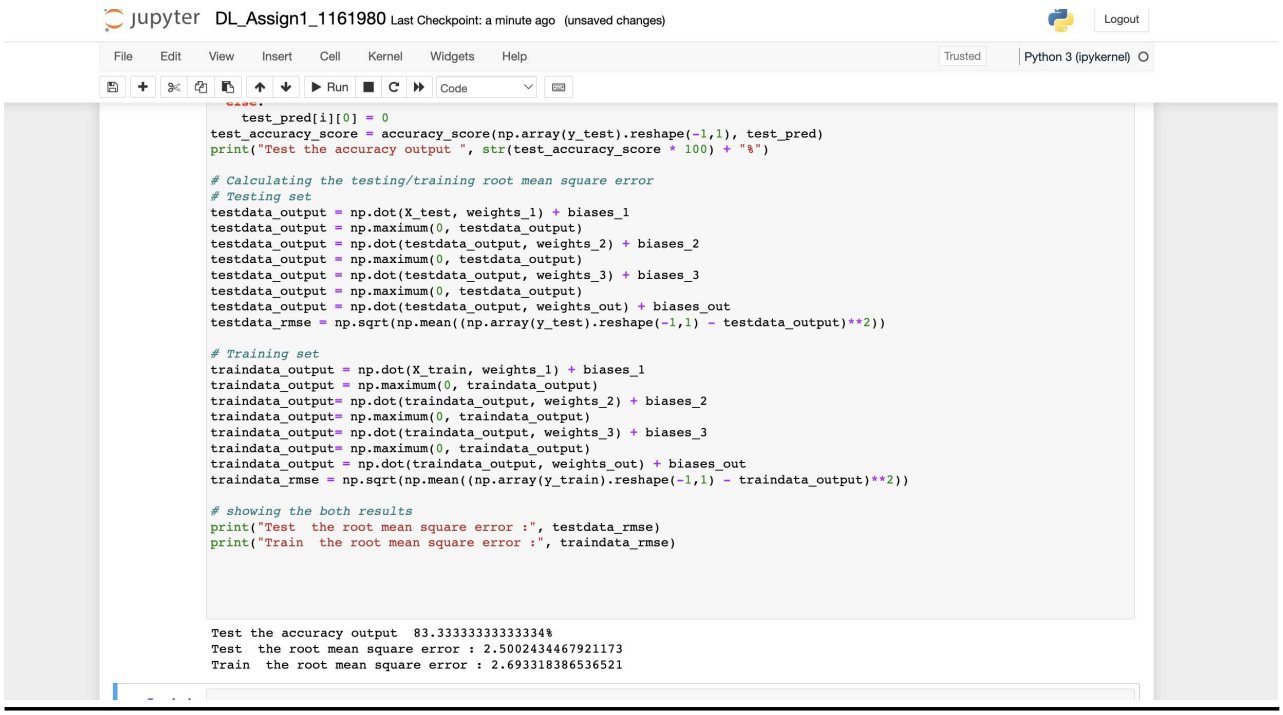
Furthermore, in this code first of all i have loaded the dataset of “fertility_Diagnosis.txt”, and prepared it for training and testing. Afterwards,the weights and biases for each layer of the network are then initialized along with it, the sigmoid activation function and its derivative are then defined, which is used to calculate the error and update the weights and biases.

Moreover,the training loop starts with a forward pass, in which the input data is processed by the network to produce an output ,Where the difference between the actual and expected outputs is then calculated. The error is backpropagated through the network in the backward pass, and the weights and biases are adjusted using the gradient descent method with a momentum term.

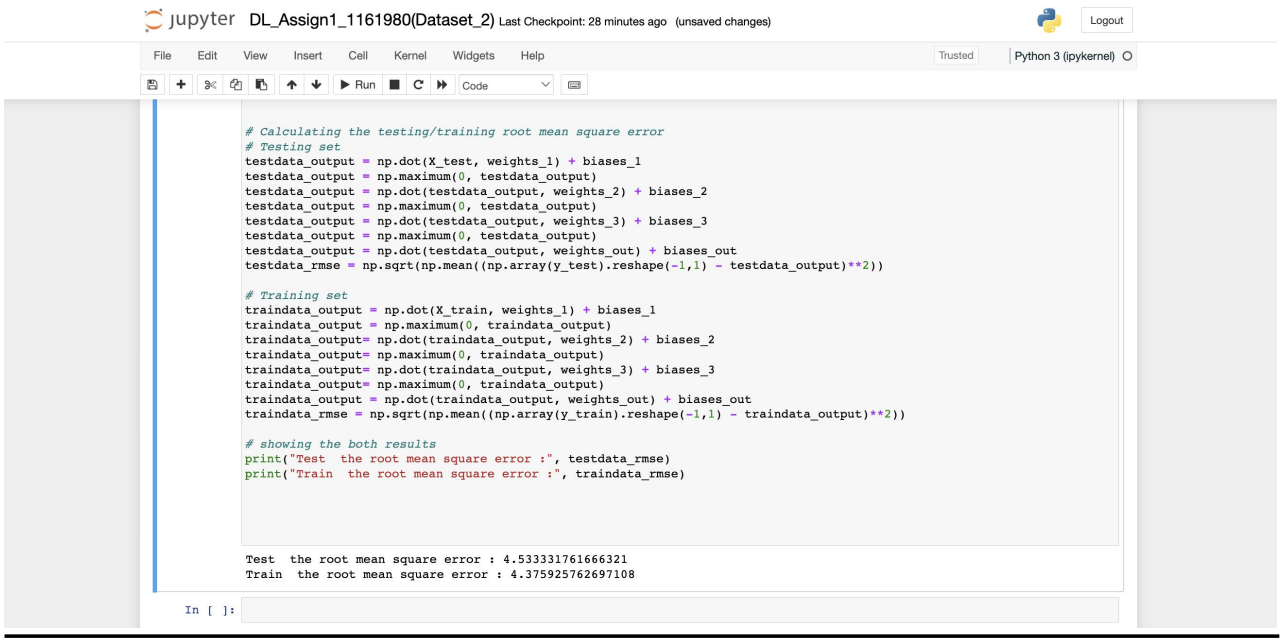
As per our requirement in assignment,i have computes the root mean square error (RMSE) on the test data to assess the network's performance. The square root of the mean of the squares of the discrepancies between the actual and anticipated values is used to produce the RMSE, which is a typical measure of the difference between the actual and expected values.

Last but not least,in order to update the weights and biases, the method use the stochastic gradient descent with momentum (SGDM) optimizer. This optimizer incorporates a momentum term into the gradient descent technique, allowing it to converge faster and avoid becoming stuck in local minima.

Outputs:1 Here i have attached the screenshot of fertility dateset output which you can see below.



Outputs :2 Here i have attached the screenshot of Wine dateset output which you can see below.



Overall,the code includes a full implementation of the BP algorithm for training a three-layer network using the SGDM optimizer. This code can be used to train multi-layer neural networks on various datasets such as wine and fertility data set and many more.