Department of Electronics & Communication Engineering
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EC460- Neural Networks and Deep Learning

Assignment 1(b): Linear Regression

Q.1. The neural network shown in Fig.1 has the following hyper parameters and input: Choose random weights and bias of the neuron and learning rate =0.01 and inputs to the neuron and target values are as follows.

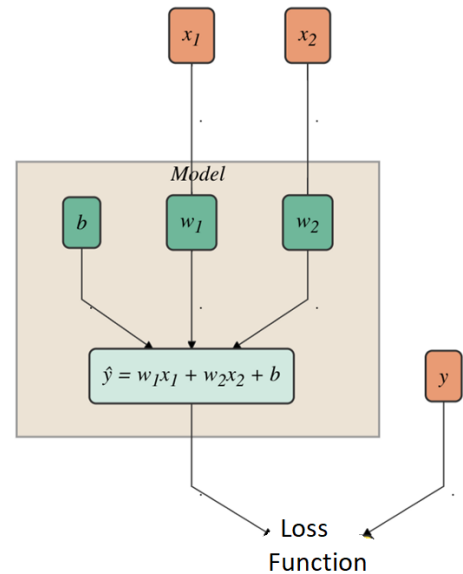| X_1	X_2	Y(target)
4	1	2
2	8	-14
1	0	1
3	2	-1
1	4	-7
6	7	-8

Fig.1

(a).Write a python code for predicted the output of neural network for given set of inputs using Stochastic Gradient Descent algorithm for the loss functions: ((i) Mean Square Error (ii) Squared Epsilon Hinge Loss (b) Plot loss curve for 100 epochs (c) Calculate MAE and RMSE of the model.

Q.2. Write a python code of Perceptron model from scratch (**without deep Learning Library**) for predicting Predicting diabetic level using Sklearn Diabetes dataset. Choose random weights and bias of the neuron and learning rate =0.0001 with Stochastic Gradient Descent algorithm for the loss Mean Square Error function (b) Plot loss curve for 100 epochs (c) Predict result on test data and compare with target (d) Calculate MAE and RMSE Metrics of the model (e) Compare results between Scikit Library and Perceptron model from scratch (f) repeat part (a) to (e) for Mean Bias Error loss function.

Q.3. Write an python code of Perceptron model from scratch (**without deep Learning Library**) for predicting House sales price using Sklearn Bostan House dataset. Choose random weights and bias of the neuron and learning rate =0.001 with Stochastic Gradient Descent algorithm for the loss Mean Square Error function (b) Plot loss curve for 100 epochs (c) Predict result on test data and compare with target (d) Calculate MAE and RMSE of the model. (e) Compare results between Scikit Library and Perceptron model from scratch (f) repeat part (a) to (e) for Mean Bias Error loss function

Q.4. Write an python code of Perceptron model from scratch (**without deep Learning Library**) for predicting car sales price using Cardekho Vehicle dataset (https://github.com/m0h1t98/Predict-Car-Price or https://www.kaggle.com/code/celestioushawk/cardekho-used-cars/data). Choose random weights and bias of the neuron and learning rate =0.001 with Stochastic Gradient Descent algorithm

for the loss Mean Square Error function (b) Plot loss curve for 100 epochs (c) Predict result on test data and compare with target (d) Calculate MAE and RMSE of the model. (e) Compare results between Scikit Library and Perceptron model from scratch (f) repeat part (a) to (e) for Mean Bias Error loss function

Q.5 Write an python code of Perceptron model from scratch(**without deep Learning Library**) for predicting the Air Quality Index (AQI) (Dataset: https://github.com/Anindya-Das02/Comparison-of-ML-models-for-predicting-AQI). Choose random weights and bias of the neuron and learning rate =0.001 with Stochastic Gradient Descent algorithm for the loss Mean Square Error function (b) Plot loss curve for 100 epochs (c) Predict result on test data and compare with target (d) Calculate MAE and RMSE of the model. (e) Compare results between Scikit Library and Perceptron model from scratch (f) repeat part (a) to (e) for Mean Bias Error loss function.