

Assignment 4

1. Generate 100 real number for the variable X from the uniform distribution $U [0,1]$. Construct the training set $T = \{ (x_1, y_1), (x_2, y_2), \dots, (x_{100}, y_{100}) \}$ using the relation

$$Y_i = \sin(2 \pi x_i) + \epsilon_i \text{ where } \epsilon_i \sim N(0, 0.25).$$

In the similar way construct a testing set of size 50

$$\text{i.e. Test} = \{ (x'_1, y'_1), (x'_2, y'_2), \dots, (x'_{50}, y'_{50}) \}.$$

Fit Artificial Neural Network of single hidden layer with 10 number of neurons and plot estimates on testing set. Also compute the RMSE, MAE, MAPE, NMSE and R^2 .

2. Add outliers to training set T : -Modify the training set T by picking up randomly 15 data points from the training set T and scale their y_i values by 20. Fit Artificial Neural Network of single hidden layer with 10 number of neurons and plot estimates on testing set. Also compute the RMSE, MAE, MAPE, NMSE and R^2 . Comment upon the efficiency of least square loss in presence of outliers.
3. Consider the Boston Housing Dataset. Divide the dataset in training, validation and testing sets. Train ANN using training set, tune parameters of ANN using validation set and evaluate the model on testing set. After tuning the best parameter on validation set, report the RMSE, MAE, MAPE, NMSE and on R^2 testing set.