

Assignment #9

Data Mining

Due: November 19, 2018

Hand in a report that contains both the computer code and the result of the below question.

1. Generate a training sample of size 1000 from the model
$$Y = \sigma(a_1^T X) + (a_2^T X)^2 + 0.3 \times Z$$
, where σ is the sigmoid function, Z is standard normal, $X=(X_1, X_2)$, each X_j being independent standard normal, and $a_1=(2,2)$, $a_2=(3,-3)$. Further, generate a test sample of size 1000 from the same model. Note that this exercise is a regression problem.
 - a. Plot the surface of responses using function $Y = \sigma(a_1^T X) + (a_2^T X)^2$,
 - b. Perform a neural network analysis using both R and Python. Fix the number of hidden layer as one. Use other options as default.
 - c. Vary the number of hidden nodes in the hidden layer from 2 up to 10.
 - d. Plot the training and test error curves as a function of the number of hidden nodes.
 - e. Determine the minimum number of hidden nodes needed to perform well for this task.
 - f. Are the results of (d) the same for R and Python?