IE406 LAB ASSIGNMENT 5

Sept, 30 2019

Understanding Bias and Variance

* Let f(x) = x + 2 \* sin (1.5 \* x) be your true function. Compute the data points where i = 1 to ((2\*pi)/(1.5\*1000)))\*k (where k is any natural number) by adding noise samples drawn from Gaussian distribution with mean 0 and variance 2 to the true function.

1. Take a simple (e.g. linear) hypothesis (model) to find a fit for estimating the above true function using mean squared error as criterion. Calculate both bias and variance to understand the concept of underfitting in ML. Choose the number of experiments to be 1000 in order to compute the expectation.
2. Now take a complex (e.g. higher order polynomial) hypothesis and repeat the above experiment to understand overfitting in ML.
3. Plot the true function and the expectation of estimated function for 1 and 2 above. Verify the equation MSE = Bias2 + Variance for both.