

Numerical Computing :: Project Nine

1. Consider the function

$$f(x) = \sin(2\pi x) + \cos(3\pi x), \quad x \in [-1, 1]. \quad (1)$$

Evaluate the function values at n evenly spaced points. You get to choose n . For d from 0 to $n - 1$, compute the least-squares coefficients of a polynomial of degree d with the same training data using both the QR method and the normal equations.

2. For each trained polynomial compute *testing error* on a set of *testing data*, which you will generate. Plot the error e_d versus d on a semilog scale. Make sure to include both (i) the error computed using the QR decomposition and (ii) the error computed using the normal equations. Interpret the error behavior. (HINT: It's related to the condition number of the matrix in the least-squares problem.)