

1 Questions

- Question 1

The goal of this question is to find parameters corresponding to a generalized linear model using least-squares regression. The basis functions you will use for this problem are given by

$$\{1, x, \exp(-x)\}.$$

The data you will use for the least squares fit are given below the instructions.

1. In Matlab, form the Vandermonde-like matrix, V , whose columns are the basis functions evaluated at the sample locations $\{x^{(i)}\}_{i=1}^5$.
2. Form the array y whose entries are the sampled function values $\{f^{(i)}\}_{i=1}^5$.
3. Solve for the basis coefficients, $\alpha = (V^T V)^{-1}(V^T y)$.

Provide the value of the coefficient corresponding to the basis function x .

Hint: Review the example in Lecture 14, video 2.

2 Answers

- Answer 1

1. The Vandermonde-like matrix is

$$V = \begin{bmatrix} 1 & 0.838 & 0.432574808472887 \\ 1 & 1.524 & 0.217838786768906 \\ 1 & 2.290 & 0.101266461853883 \\ 1 & 8.258 & 0.000259176826868 \\ 1 & 9.133 & 0.000108040975502 \end{bmatrix}$$

2. The array y is given by

$$y^T = [1.439, 1.290, 1.003, 0.990, 0.940].$$

3. Solving for $\alpha = (V^T V)^{-1}(V^T y)$ in Matlab, we find

$$\alpha^T = [0.937126557618731, \quad 0.002754314563414, \quad 1.217548266642066]$$

The coefficient corresponding to the basis x is $\alpha_2 = 0.002754314563414$.