

Assignment 2 :

Date : 22-09-2020

1. Generate a set of points around a line $y = ax + b$

- (a) Choose $a = 2$ and $b = 3$
- (b) Select the range for x as $[-10, 10]$ and generate $n = 100$ values for x in that interval.
- (c) Compute the values of y for each x as $y_i = 2x_i + 3$.
- (d) Plot the line $y = 2x + 3$ in black color.
- (e) Generate a set of n points around the line using the equation

$$y_i = 2x_i + 3 + \sigma\mathcal{N}(0, 1) \quad (1)$$

where σ is the standard deviation and $\mathcal{N}(0, 1)$ is the zero-mean unity-variance normal distribution

- (f) Show the scatter plot of these noisy points (in red color) on the same graph generated in step (d).
2. Plot the average error surface E for different values of a and b in the interval of $[-10 : 0.1 : 10]$.
- (a) Vary both a and b in steps of 0.1 in the interval $[-10, 10]$
 - (b) Compute the element-wise error as $e_i = y_i - \hat{y}_i$ where $\hat{y}_i = ax_i + b$ and y_i is computed using equation 1
 - (c) Compute the average error as

$$E = \frac{1}{n} \sum_{i=1}^n e_i^2 \quad (2)$$

- (d) Compute the average error values for all combinations of a and b .
- (e) Plot the error surface with the values of a along x -axis, that of b along y -axis and E along z -axis.