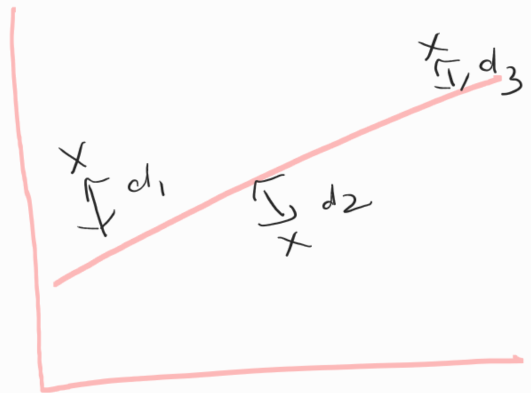
Since $y = mx + b$

So $E = d_1^2 + d_2^2 + d_3^2 + d_4^2 \ldots\ldots$



Since $d_1 = y_1 - \hat{y}_1$, $d_2 = y_2 - \hat{y}_2$ ($\hat{y}$ = predicted value)

$$\text{Error}(E) = d_1^2 + d_2^2 + d_3^2 \ldots d_n^2$$

$$E = \sum_{i=0}^{n} y_i - \hat{y}_i$$

$$= \sum_{i=0}^{n} (y_i - (mx_i + b))^2$$

To minimize error E $\frac{\delta E}{\delta M} = \frac{\delta E}{\delta b} = 0$

$$\therefore \frac{\delta E}{\delta b} = 0$$

$$\sum \frac{\delta (y_i - (mx_i + b))^2}{\delta b} = 0$$

$$\therefore \sum 2(y_i - mx_i - b) \times -1 = 0$$

$$\therefore \sum -2(y_i - mx_i - b) = 0$$

$$\therefore \sum y_i - mx_i - b = 0$$

$$\therefore \frac{\sum y_i}{n} - \frac{\sum mx_i}{n} - \frac{\sum b}{n} = 0$$

$$\bar{y} - m\bar{x} - b = 0$$

$$\therefore b = \bar{y} - m\bar{x}$$

Now $E = \Sigma\, y - \hat{y}$

$$E = \Sigma \left(y_i - (m x_i + \bar{y} - m\bar{x}) \right)^2$$

$$\frac{\delta E}{\delta m} = \Sigma 2 \left(y_i - m x_i - \bar{y} + m\bar{x} \right) \times (-x_i + \bar{x})$$

$$= \Sigma \left[(y_i - \bar{y}) - m(x_i - \bar{x}) \right] (x_i - \bar{x}) = 0$$

$$= \Sigma (y_i - \bar{y})(x_i - \bar{x}) - m(x_i - \bar{x})^2 = 0$$

$$\therefore m = \frac{\sum_{i=1} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2}$$