

# Simple Linear Regression

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## 1 Linear model

The simple linear regression model is given by:

$$Y = b + m * X_i + \epsilon$$

## 2 Cost function

$$E = \frac{1}{n} \sum (y_i - (b + m.x_i))^2$$

## 3 Gradient descent

$$\frac{\delta E}{\delta m} = -\frac{2}{n} \sum (y_i - (b + m.x_i)).x_i$$

$$\frac{\delta E}{\delta b} = -\frac{2}{n} \sum (y_i - (b + m.x_i))$$

**Update parameters:**

*a: learning rate*

$$m = m - \alpha \frac{\delta E}{\delta m}$$

$$b = b - \alpha \frac{\delta E}{\delta b}$$