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### **Least Square Method**

### For Simple Linear Regression:

$$y = heta_0 + heta_1 x$$

$$heta_1 = rac{\sum_{i=1}^m (x_i - ar{x})(y_i - ar{y})}{\sum_{i=1}^m (x_i - ar{x})^2} \ heta_0 = ar{y} - heta_1 ar{x}$$

### **Gradient Descent (Iterative)**

### For Simple Linear Regression:

$$y= heta_0+ heta_1 x$$

$$heta_0 = heta_0 - lpha \cdot rac{1}{m} \sum_{i=1}^m (h_ heta(x_i) - y_i)$$

$$heta_1 = heta_1 - lpha \cdot rac{1}{m} \sum_{i=1}^m (h_ heta(x_i) - y_i) x_i.$$

### **Least Square Method**

### For Multivariate Linear Regression:

$$y= heta_0+ heta_1x_1+ heta_2x_2+\cdots+ heta_nx_n$$

$$heta_j = rac{\sum_{i=1}^m (x_j^{(i)} - ar{x_j})(y^{(i)} - ar{y})}{\sum_{i=1}^m (x_j^{(i)} - ar{x_j})^2}, \quad ext{for } j = 1, 2, ..., n$$
  $heta_0 = ar{y} - heta_1 ar{x_1} - heta_2 ar{x_2} - ... - heta_n ar{x_n}$ 

Or:

### **Gradient Descent (Iterative)**

### For Multivariate Linear Regression:

$$y= heta_0+ heta_1x_1+ heta_2x_2+\cdots+ heta_nx_n$$

$$heta_0 = heta_0 - lpha rac{1}{m} \sum_{i=1}^m (h_ heta(x^{(i)}) - y^{(i)})$$

$$heta_j = heta_j - lpha rac{1}{m} \sum_{i=1}^m (h_ heta(x^{(i)}) - y^{(i)}) x_j^{(i)}, \quad ext{for } j = 1, 2, ..., n.$$