1 Solution

X1: 1.5, 1.2, 1.7, 1.8, 1.0, 1.1, 2.0
X2: 10.2, 10.4, 10.8, 11.5, 14.2, 9.4, 10.4
Weights: 0.5,1
Y: 5.6, 5.4, 5.7, 5.9, 4.9, 6.0, 5.5
$\lambda = 2$
$\alpha = 0.001$

- **Step1**: Compute

$$\Sigma_{j=1}^{2} x_{ij} B_j =$$

$$[(1.5{*}0.5{+}10.2{*}1), (1.2{*}0.5{+}10.4{*}1), (1.7{*}0.5{+}10.8{*}1), (1.8{*}0.5{+}11.5{*}1), (1{*}0.5{+}14.2{*}1), (1.1{*}0.5{+}9.4{*}1), (2{*}0.5{+}10.4{*}1)$$

$$= [10.95, 11, 11.65, 12.4, 14.7, 9.95, 11.4]$$

- **Step2:** Compute

$$\Sigma_{i=1}^{n} (y_i - \Sigma_{j=1}^{2} x_{ij} B_j)^2 =$$

$$[5.35^2 + 5.6^2 + 5.95^2 + 6.5^2 + 9.8^2 + 3.95^2 + 5.9^2] = 284.0875$$

- **Step 3:** Compute

$$\lambda \Sigma_{j=1}^{2} |\beta_j|$$

$$2 * (0.5 + 1) = 3$$

- **Step 4:** Final value =>284.0875+3 = 287.0875

Let C represent the Cost. Now we compute the gradients to update the weights:

- Formula for gradient update for $B_1$is:

$$\frac{\delta C}{\delta B_1} = 2 * \Sigma_{i=1}^{n} (y_i - \Sigma_{j=1}^{2} x_{ij} B_j) * (-x_{i1}) + \lambda =$$

$$2 * [5.35 * 1.5 + 5.6 * 1.2 + 5.95 * 1.7 + 6.5 * 1.8 + 9.8 * 1 + 3.95 * 1.1 + 5.9 * 2] + 2 = 127.01$$

- Similarly for B_2:

$$\frac{\delta C}{\delta B_2} = 2 * \Sigma_{i=1}^{n} (y_i - \Sigma_{j=1}^{2} x_{ij} B_j) * (-x_{i2}) + \lambda =$$

$$2 * [5.35 * 10.2 + 5.6 * 10.4 + 5.95 * 10.8 + 6.5 * 11.5 + 9.8 * 14.2 + 3.95 * 9.4 + 5.9 * 10.4] + 2 = 980.94$$

- Hence updates for weights will be:

$$B_1^{new} = B_1^{old} - \alpha * \frac{\delta C}{\delta B_1}$$

$$= 0.5 - 0.001 * 127.01 = 0.37299$$

$$B_2^{new} = B_2^{old} - \alpha * \frac{\delta C}{\delta B_2}$$

$$= 1 - 0.001 * 980.94 = 0.01906$$