$$h_\theta(x) = \theta_0 + \theta_1 x$$

$$J(\theta) = \frac{1}{2m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)})^2$$

$$J(\theta_0, \theta_1)$$

$$\theta_j = \theta_j - \alpha\frac{\partial J(\theta)}{\partial \theta_j}$$

Repeat until converge {

$$tmp0 : \theta_0 = \theta_0 - \alpha\frac{\partial J(\theta)}{\partial \theta_0}$$

$$tmp1 : \theta_1 = \theta_1 - \alpha\frac{\partial J(\theta)}{\partial \theta_1}$$

}

$$\frac{\partial J(\theta)}{\partial \theta_j} = \frac{\partial}{\partial \theta_j}(\frac{1}{2m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)})^2) = \frac{\partial}{\partial \theta_j}(\frac{1}{2m}\sum_{i=1}^{m}(\theta_0 + \theta_1 x^{(i)} - y^{(i)})^2)$$

j = 0:

$$\frac{\partial J(\theta)}{\partial \theta_0} = \frac{1}{m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)})$$

j = 1:

$$\frac{\partial J(\theta)}{\partial \theta_1} = \frac{1}{m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)}) \cdot x^{(i)}$$

$$h_\theta(x) = \theta_0 x_0 + \theta_1 x_1 + \theta_2 x_2 \cdots + \theta_n x_n$$

Repeat until converge {

$$\theta_j = \theta_j - \alpha\frac{\partial J(\theta)}{\partial \theta_j} = \theta_j - \alpha\frac{1}{m}\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)}) \cdot x_j^{(i)}$$

}

$$g(z) = \frac{1}{1+e^{-z}}$$

$$h_\theta(x) = g((\theta^T x)) = \frac{1}{1+e^(-\theta^T x)}, \theta^T x = \theta_0 + \theta_1 x_1 + \theta_2 x2 + \cdots + \theta_n x_n$$

$$I_{x0} = -\log(p(x_0))$$

$$H(x) = -\sum_{i=1}^{n} p(x_i)\log(p(x_i))$$

$$D_{K||L}(p||q) = \sum_{i=1}^{n} p(x_i)\log(\frac{p(x_i)}{q(x_i)}) = \sum_{i=1}^{n} p(x_i)\log(p(x_i)) - \sum_{i=1}^{n} p(x_i)\log(q(x_i))$$

$$D_{K||L}(p||q) = -H + [-\sum_{i=1}^{n} p(x_i)\log(q(x_i))]$$

$$H(p,q) = -\sum_{i=1}^{n} p(x_i)\log(q(x_i))$$

$$J(\theta) = -\frac{1}{m}[\sum_{i=1}^{m} y^{(i)}\log(h_\theta(x^{(i)})) + (1-y^{(i)})\log(1-(h_\theta(x^{(i)})))]$$

Repeat until converge {

$$\theta_j = \theta_j - \alpha\sum_{i=1}^{m}(h_\theta(x^{(i)}) - y^{(i)}) \cdot x_j^{(i)}$$

}