

Regularized linear regression cost and gradient

$$J(\theta) = \frac{1}{2m} \left(\sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)})^2 \right) + \frac{\lambda}{2m} \left(\sum_{j=1}^n \theta_j^2 \right),$$

$$\frac{\partial J(\theta)}{\partial \theta_j} = \left(\frac{1}{m} \sum_{i=1}^m (h_{\theta}(x^{(i)}) - y^{(i)}) x_j^{(i)} \right) + \frac{\lambda}{m} \theta_j \quad \text{for } j \geq 1$$