

Classification and Representation

- ✓ **Video:** Classification
8 min
- ✓ **Reading:** Classification
2 min
- ✓ **Video:** Hypothesis Representation
7 min
- ✓ **Reading:** Hypothesis Representation
3 min
- ✓ **Video:** Decision Boundary
14 min
- ✓ **Reading:** Decision Boundary
3 min

Logistic Regression Model

- ✓ **Video:** Cost Function
10 min
- ✓ **Reading:** Cost Function
3 min
- ✓ **Video:** Simplified Cost Function and Gradient Descent
10 min
- ✓ **Reading:** Simplified Cost Function and Gradient Descent
3 min
- ✓ **Video:** Advanced Optimization
14 min
- ✓ **Reading:** Advanced Optimization
3 min

Multiclass Classification

Review

Solving the Problem of Overfitting

Review



Cost Function

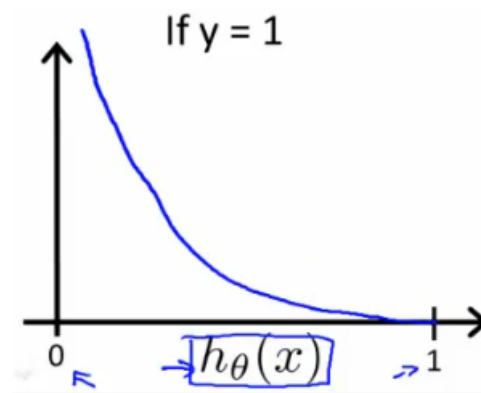
We cannot use the same cost function that we use for linear regression because the Logistic Function will cause the output to be wavy, causing many local optima. In other words, it will not be a convex function.

Instead, our cost function for logistic regression looks like:

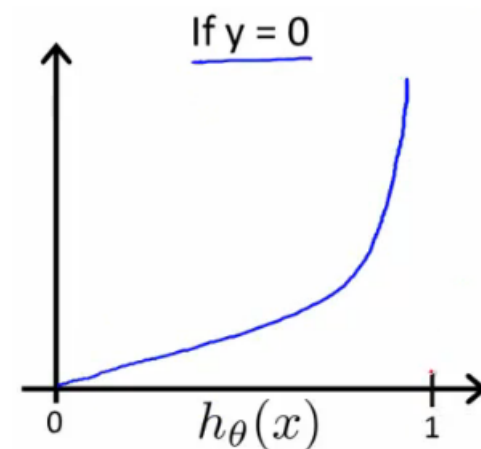
$$J(\theta) = \frac{1}{m} \sum_{i=1}^m \text{Cost}(h_{\theta}(x^{(i)}), y^{(i)})$$

$$\begin{aligned} \text{Cost}(h_{\theta}(x), y) &= -\log(h_{\theta}(x)) & \text{if } y = 1 \\ \text{Cost}(h_{\theta}(x), y) &= -\log(1 - h_{\theta}(x)) & \text{if } y = 0 \end{aligned}$$

When $y = 1$, we get the following plot for $J(\theta)$ vs $h_{\theta}(x)$:



Similarly, when $y = 0$, we get the following plot for $J(\theta)$ vs $h_{\theta}(x)$:



$$\begin{aligned} \text{Cost}(h_{\theta}(x), y) &= 0 \text{ if } h_{\theta}(x) = y \\ \text{Cost}(h_{\theta}(x), y) &\rightarrow \infty \text{ if } y = 0 \text{ and } h_{\theta}(x) \rightarrow 1 \\ \text{Cost}(h_{\theta}(x), y) &\rightarrow \infty \text{ if } y = 1 \text{ and } h_{\theta}(x) \rightarrow 0 \end{aligned}$$

If our correct answer 'y' is 0, then the cost function will be 0 if our hypothesis function also outputs 0. If our hypothesis approaches 1, then the cost function will approach infinity.

If our correct answer 'y' is 1, then the cost function will be 0 if our