Linear Regression Contd.

Gradient descent approach

Training set of housing prices (Portland):

	Size	Price
0	2104	399900
1	1600	329900
2	2400	369000
3	1416	232000
4	3000	539900

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

θ_i 's: Parameters

How to choose θ_i 's?

Hypothesis: $h_y(x) = \theta_0 + \theta_1 x$ Parameters: θ_0, θ_1

Cost function :

$$J\left(\theta_0, \theta_1\right) = \frac{1}{2m} \sum_{i=1}^{m} \left(h_q\left(x^{(j)}\right) - y^{(p)}\right)^2$$

Goal : $\min_{\theta_1 \beta_1} J\left(\theta_0, \theta_1\right)$

Hypothesis: $h_y(x) = \theta_1 x$ Parameters: θ_1

Cost function : $J\left(\theta_0, \theta_1\right) = \frac{1}{2m} \sum_{i=1}^{m} \left(h_v\left(x^{(i)}\right) - y^{(j)}\right)^2$ Goal : $\min_{\theta_1} J\left(\theta_1\right)$

Have some function $J\left(\theta_0, \theta_1\right)$ Want $\min_{\theta_1} J\left(\theta_0, \theta_1\right)$ - Start with some θ_0, θ_1 - Keep changing θ_0, θ_1 to reduce $J\left(\theta_0, \theta_1\right)$ until we hopefully end up at a minimum.

Gradient Descent Algorithm repeat until convergence {

$$\theta_j s = \theta_j - \frac{\partial}{I} J\left(\theta_0, \theta_1\right)$$

(simultaneous update $j = 0$ and $j = 1$)

Two Variable Model

Gradient Descent Algorithm repeat until convergence { $\theta_j := \theta_j - \alpha \frac{\partial}{\partial \theta_j} J(\theta_0, \theta_1)$ (for j = 0 and j = 1) 1

Linear Regression Model

$$h_0(x) = \theta_0 + \theta_1 x$$
$$J(\theta_0, \theta_1) = \frac{1}{2m} \sum_{h=1}^{m} \left(h_0\left(x^{(i)}\right) - y^{(i)}\right)^2$$

Or θ_0^{old}