Linear Regression - "multivariete linear regression"

In regression problems, we are taking input variables and trying to fit the output onto a continuous expected result function.

Variables

- x_j^i = value of feature j in the i^{th} traingin example

- x^i = the column vector of all the feature inputs of the i^{th} training example

- m = number of traning examples

- n = $|x^i|$; the number of features

Hypothesis function

$h_\theta(x) = \Theta_0 + \Theta_1 x_1 + \Theta_2 x_2 + \Theta_3 x_3 + ... + \Theta_n x_n$

- equation of a streight line

Cost function

$J(\Theta_0, \Theta_1) = \frac{1}{2m} \sum_{i=1}^{m} (h\theta(x(i)) - y(i))^2$

- meassuring accuracy of hypothesis

- also called "Square error function"

Gradient Descent

repeat until convergence: {

$\Theta_0 := \Theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x_i) - y_i)$

$\Theta_1 := \Theta_1 - \alpha \frac{1}{m} \sum_{i=1}^{m} ((h_\theta(x_i) - y_i) * x_i)$

}

- estimate the parameters in hypothesis function

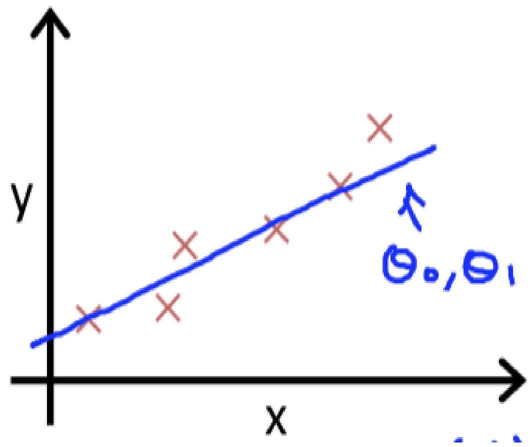
- start with a guess for our hypothesis and then repeatedly apply these gradient descent equations, the hypothesis will become more and more accurate

- Θ_0 = a constant that will be changing simultaneously with Θ_1

- $x_i y_i$ = values of the geven training set

Example Data & Notes

input x	output y
1	2
2	3
3	4



- must be linear relationship between independent and dependent variables

- can be used with supervised learning

- always seperates data with a straigh line