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} training example

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

- m = number of training 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 straight line

Cost function

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

- measuring accuracy of hypothesis

- also called "Square error function"

Gradient Descent

repeat until convergence: {

$\Theta_j := \Theta_j - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) * x_j^i$

for j :=0..n

}

- estimate the parameters in hypothesis function

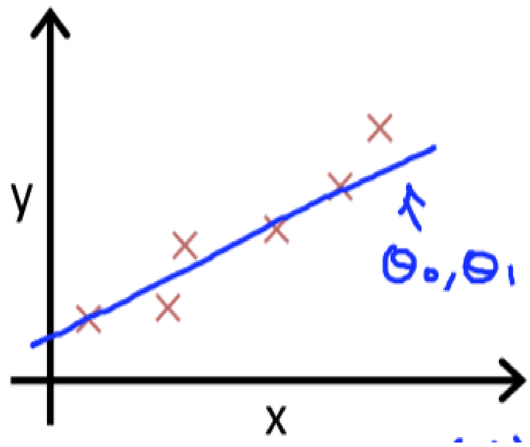
- start with a guess for our hypothesis and then repeatedly apply these gradient descent equations, the hypothesis will become more and more accurate

- Θ_j = a constant that will be changing simultaneously with all other Θ_j

- $x^{(i)} y^{(i)}$ = values of the given 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 straight line