Regularized Linear Regres

Note: [8:43 - It is said that X is non-invertible if m $\leq$ n. T statement should be that X is non-invertible if m < n, an invertible if m = n.

We can apply regularization to both linear regression ar regression. We will approach linear regression first.

Gradient Descent

We will modify our gradient descent function to separat rest of the parameters because we do not want to pena

Repeat {

$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_0^{(i)}$$

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

}

The term $\frac{\lambda}{m}\theta_j$ performs our regularization. With some r update rule can also be represented as:

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

The first term in the above equation, $1 - \alpha\frac{\lambda}{m}$ will alway Intuitively you can see it as reducing the value of θ_j by s every update. Notice that the second term is now exactl was before.

Normal Equation

Now let's approach regularization using the alternate m iterative normal equation