Lecture 5 (Linear Regression)

1   Mathematical Formulation

The equation for linear regression is:

$$y = \theta_1 \cdot x + \theta_0 + \epsilon$$

where, $h_\theta(x) = \theta_1 \cdot x + \theta_0$

The more general version when $x \in \mathbb{R}^n$ is:

$$h_\theta(x) = \sum_{i=0}^{n} \theta_i \cdot x_i = \theta^T \cdot x_i$$

(x is $n+1$ dimensional with $x_0 = 1$)

2   How is h_θ Formulated?

Loss function:

$$J(\theta) = \frac{1}{2 \cdot m} \cdot \sum_{i=1}^{m} (y_i - h_\theta(x_i))^2 = \frac{1}{m} \cdot \sum_{i=1}^{m} (y_i - \theta^T \cdot x_i)^2$$

Why is *abs* not taken instead of square? This is because *abs* is not differentiable at some points and squared error has "natural" justification (sir didn't elaborate much about this)

3   How do we find θ?

We try to compute

$$\underset{\theta \in \mathbb{R}^n}{argmin}(J(\theta))$$

$J(\theta)$ is quadratic in θ.