10.09.2024

Machine Learning

google classroom → 5G2biah

Linear regression

y

$m = x$ এর কতটুকু impact

negative value remove করার জন্য square করা হয় (Loss)

J দিয়ে mitate করাতে হয়

cost function: loss function averaged over all training examples

$$h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2$$

$$price = \theta_0 + \theta_1 \times size + \theta_2 \times Bedroom$$

$\theta_0 = -80000$

$\theta_1 = 200$

$\theta_2 = 10000$

$\Rightarrow -80000 + 200 \times 1850 + 10000 \times 4$

$\Rightarrow 330{,}000$

$$MSE = \frac{1}{5}\left(2^2 + (-1)^2 + (-2)^2 + 1^2 + 1^2\right)$$

$$= \frac{11}{5}$$

$$= 2.2$$

10.30 — শুরু (multipourpous hall) - workshop

best parameter find করা
or, optimize করা

Gradient Descent

A technique that iteratively finds the weights and bias that produce model with lowest loss.

প্রত্যেক training example এর সাথে কাজ করে individually

batch gradient decent and stochastic

α - learning rate

θ - parameters (weight)

11.09.2024

Macine Learning

$h_\theta(x) = \theta_0 + \theta_1 x$ — main formula

First iteration

$\alpha = 0.01$

Size	price

$h_\theta(x) = 0.25\, x_1 - 100$

Data points:

For $x_1(1) = 2104$ $\quad y^{(1)} = 400$

" $x_1^{(2)} = 1600$ $\quad y^{(2)} = 330$

" $x_1^{(3)} = 2400$ $\quad y(3) = 369$

Batch GD (one iteration)

$\Rightarrow h_\theta(x^{(1)}) = 0.25 \times 2104 - 100 = 426$

$\Rightarrow h_\theta(x^{(2)}) = 0.25 \times 1600 - 100 = 300$

$\Rightarrow h_\theta(x^{(3)}) = 0.25 \times 2400 - 100 = 500$

loss for $x_1^{(1)} = 426 - 400 = 26$

loss for $x_1^{(2)} = 300 - 330 = -30$

loss for $x_1^{(3)} = 500 - 369 = 131$

Batch (Gradient Decent)

update θ_0

$$\theta_0 = \theta_0 - \alpha \frac{1}{3}(26 + (-30) + 131)$$

$$= -100 - 0.01 \times \frac{1}{3} \times 127$$

$$= -100.42$$

Batch

update rule:

$$\theta_0 = \theta_0 - \alpha (h_\theta(x^{(i)}) - y^{(i)})$$

$$\theta_1 = \theta_1 - \alpha (h_\theta(x^{(i)}) - y^{(i)}) x_1^{(i)}$$

$$\theta_1 = \theta_1 - \alpha \frac{1}{3} ((26 \times 2104) + (-30 \times 1600) + (131 \times 2400))$$

$$= 0.25 - (0.01 \times \frac{1}{3} \times 321104$$

$$= 0.25 - 1070.35$$

$$= -1070.10$$

overfitting and underfitting

overfitting: know everything about trained data but dosen't know anything about outside data and performs poorly

underfitting: perform poorly in every case

* models perform should perform well in traning data and test data

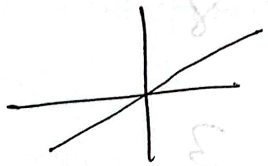
25.09.24

ML

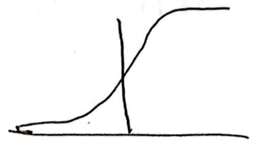
Logistic regression → classification Algorithm.

Transform linear output using the sigmoid function

$z = 2x+5$



$y = \frac{1}{1+e^{-z}}$



0 And 1

why we use Logistic regression

Logistic function also called sigmoid function

⇒ Diffrence between Linear and Logistic regre for classification - Logistic R is used (yes or no)

1.10.24

ML

Logistic regression Model

Sigmoid function – 0 থেকে 1 এর ভিতরে নিয়ে আসে

Dicision Boundary

$$z = \theta_0 + \theta_1 x_1 + \cdots$$

$$y' = \frac{1}{1 - e^{-z}}$$

Ex1

Hours of study	Attendence (%) (x_2)	pass/Fail (y)
5	60	
6	65	
8	80	
7	70	
9	85	
4	50	

$\theta_0 = -50$, $\theta_1 = 6$, $\theta_2 = 1$

Hypothisis function $h_\theta(x) = \dfrac{1}{1 + e^{-(-50 + 6x_1 + 1x_2)}}$

$$\Rightarrow -(-50 + 6x_1 + x_2) = 0$$

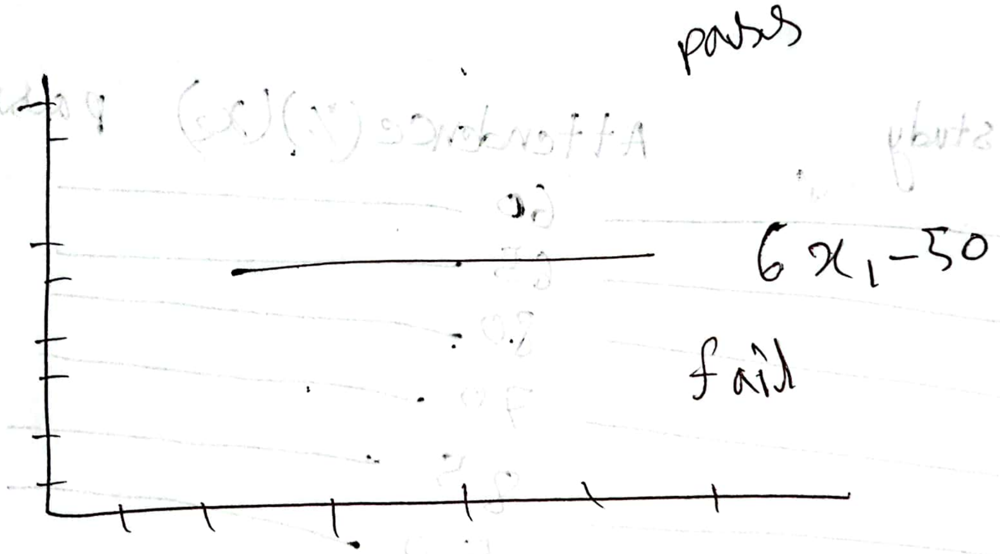
$$= 50 = 6x_1 + x_2$$

$$\Rightarrow x_2 = 6x_1 - 50$$ – Boundary line

this Line Represents the decision boundary

⇒ above the line ($x_2 > 6x_1 - 50$) : the student is predicted to pass (class 1)

⇒ Below the line ($x_2 < 6x_1 - 50$) : " " " fail (class 0)



⇒ what is logistic

⇒ dif betwe logis and Linear

⇒ what is Decsion boundry