Interpretation of Coefficients

Simple linear Regression

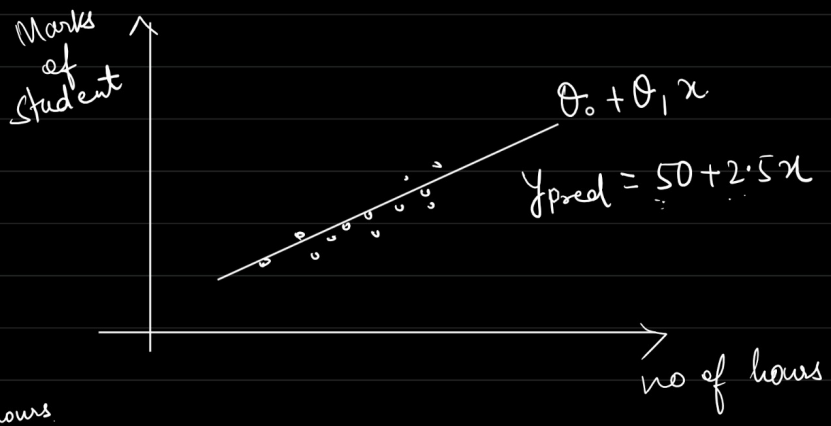
$$h_\theta(x) = \theta_0 + \theta_1 x$$

$$y_{pred} = \beta_0 + \beta_1 x$$

Ex1: Marks of student based on no of hours studied

y = marks of student

x = no of hours.



β_0 β_1

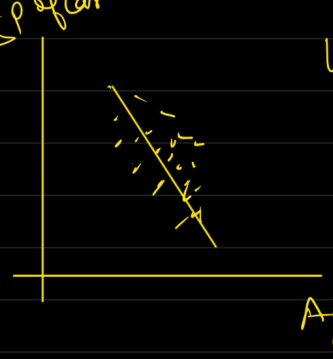
$\rightarrow h_\theta(x) = 50 + 2.5\,x$ (x: No. of hours)

$\beta_1 \rightarrow$ With 1 unit increase in number of hours studied, the marks of students will increase by 2.5 units on an average.

$\beta_0 \rightarrow$ The average score is 50 when no of hours studies is equal to 0.

$50 + 2.5(0)$

Ex-2: SP of car



Want to Predict Price of Car based on Age.

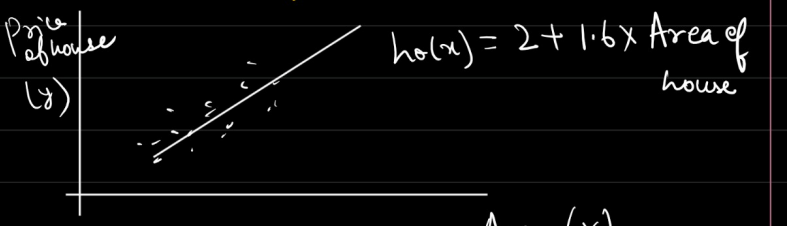
$$y_{pred} = 120 - 3.2\,(Age)$$

(β_0: 120, β_1: 3.2)

$\beta_1 \rightarrow$ With 1 unit increase in Age of car, the SP of car is decreased by 3.2 units on an avg.

β_0 → The average selling price of car is 120 Lakhs if the age of car is 0 (newly bought)

Ex-3 Price of house based on area of house



$$y_{pred} = \underset{\downarrow}{2} + \underset{\downarrow}{1.6} \times \text{Area of house}$$
$$\beta_0 \quad \beta_1$$

β_1 → with 1 unit increase in Area of house, the price of house increases by 1.6 units

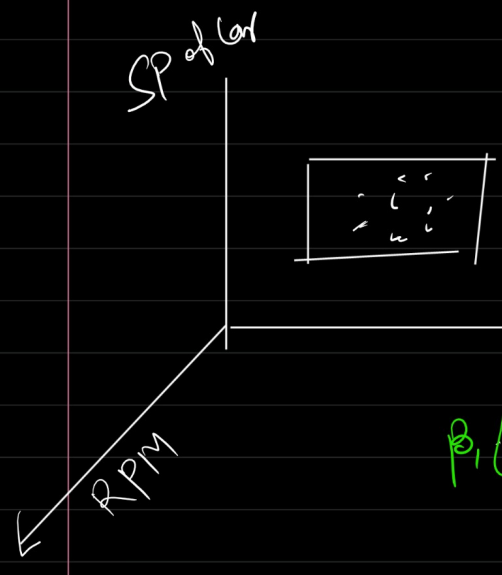
β_0 → The avg price of house is 2 Cr when area of house is 0.

* Multiple Linear Regression

↳ more than 1 independent variable / features

↳ $h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 - - - - \theta_n x_n$

$$y_{pred} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + - - - \beta_n x_n$$



$$h_\theta(x) = \underset{\uparrow}{3} - \underset{\downarrow}{0.52} \times \text{Age of car} + \underset{\downarrow}{2.5} \times \underline{\text{RPM}}$$
$$\beta_0/\theta_0 \quad \beta_1/\theta_1 \quad \beta_2\,\theta_2$$

$\beta_1(0.52)$ → with 1 unit increase in age of car, the SP of car decreases by 0.52 units on an average keeping RPM constant

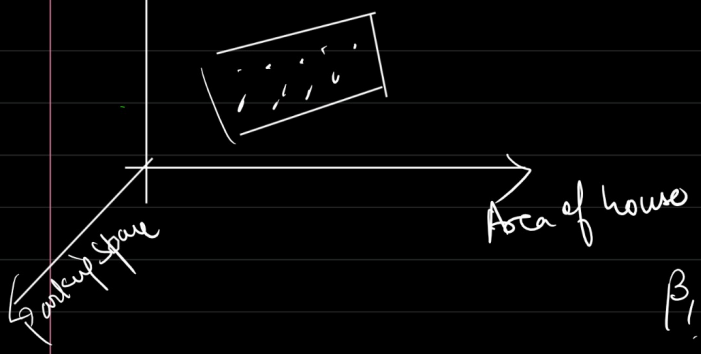
$\beta_2(2.5)$ → with 1 unit increase in RPM the selling price of car increases by 2.5 units on an avg keeping Age of car constant.

$\beta_0(3)$ → The avg SP of car in 3 Units keeping all the factors constant.

Ex-3

Predict

y price price of house



$h_\theta(x) = 3.5 + 8.2$ Area of house $+ 3.2$ Parking Space.

$\beta_0 \quad \beta_1 \quad \beta_2$

β_1 → With 1 unit increase in Area of house, the price of house on an avg increases by 8.2 units, keeping other factors constant

β_2 - With 1 unit increase in parking space, on an avg the price of house increase by 3.2 units keeping all the features constant.

β_0 → The avg price of house is 3.5 or after keeping all the factors constant

* Feature importance

$$y_{pred} = h_\theta(x) = 3.5 + 8.2 \text{ Area of house} + 3.2 \text{ Parking Space} - 2.3 \cdot \text{distance of Airport.}$$

	Coeff
Area of house	8.2
Parking space	3.2
distance of Airport	2.3

Coeff's should be arranged with its absolute value.

→ The highest coeff will be the most important feature ⇒ Area of house.