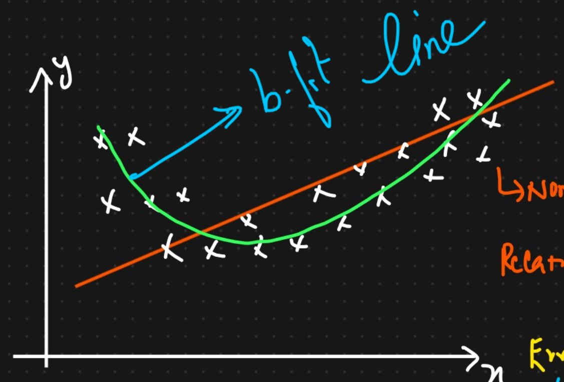
Polynomial Regression



↳ Non linear Relationship

Error ↑↑ high

$h_\theta(x) = \theta_0 + \theta_1 x_1$ → Simple Linear Regression

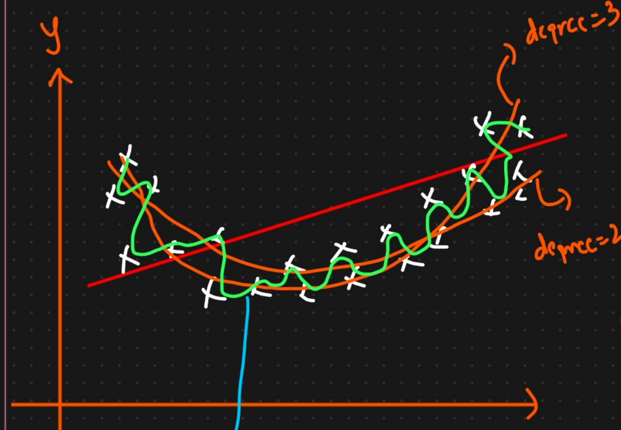
$h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_3 + \dots + \theta_n x_n$

↳ Multiple Linear Regression

Polynomial Regression

⇓

polynomial degrees.



polynomial degree = 0 $\quad h_\theta(x) = \theta_0 * 1 \Rightarrow \theta_0 x_1^0$

polynomial degree = 1 $\quad h_\theta(x) = \theta_0 x_1^0 + \theta_1 x_1^{(1)}$ [Simple Linear Regression]

polynomial degree = 2 $\quad h_\theta(x) = \theta_0 x_1^0 + \theta_1 x_1^1 + \theta_2 x_1^2$

⇓

Polynomial degree = 3 $\quad h_\theta(x) = \theta_0 x_1^0 + \theta_1 x_1^1 + \theta_2 x_1^2 + \theta_3 x_1^3$

⋮

if the degree is too high it will overfit the model
So need to find a suitable degree that doesn't overfit the model.

Polynomial degree = n

$$\boxed{h_\theta(x) = \theta_0 x_1^0 + \theta_1 x_1^{(1)} + \theta_2 x_1^2 + \theta_3 x_1^3 + \dots + \theta_n x_1^n}$$

⇓

Simple Polynomial Regression

{1 i/p feature, 1 o/p feature}

⊛ Multiple Polynomial Regression

{Multiple Independent features}

$$\overbrace{\text{indep } x_1 \quad x_2 \quad x_3}$$ y → dependent

Polynomial degree = 2

$$\boxed{h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_2^2}$$