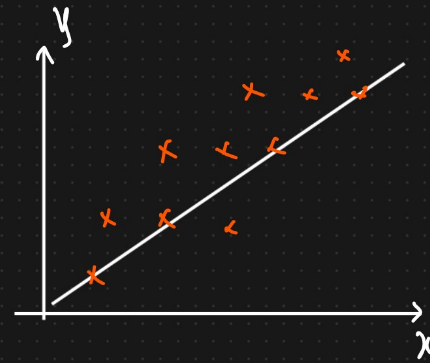
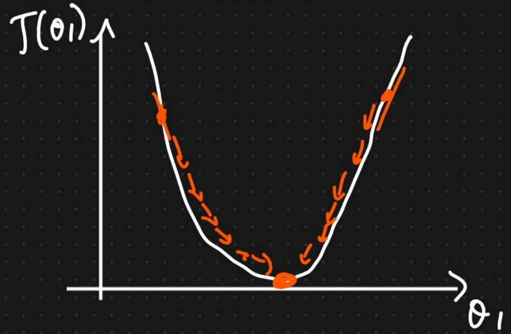
MSE , MAE , RMSE [Cost functions]

① Mean Squared Error (MSE)

② Mean Absolute Error (MAE)

③ Root Mean Squared Error (RMSE)





$$J(\theta_0, \theta_1) = \frac{1}{n}\sum_{i=1}^{n}\left(y_i - h_\theta(x)^2\right)$$

⇓

Mean Squared Error

INR $(INR)^2$

Price $(y-\hat{y})^2$

① Mean Squared Error (MSE) [Cost fn]

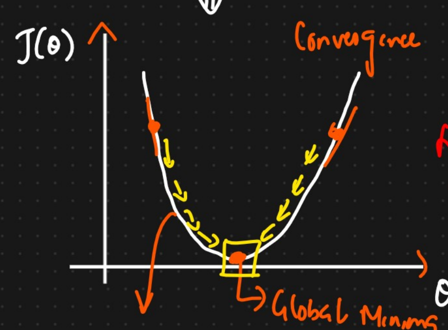
$$MSE = \frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{n} \longrightarrow \text{Quadratic Equation}$$

⇓

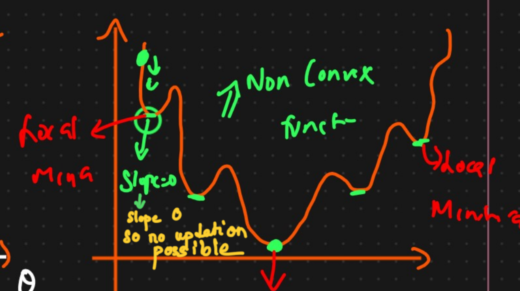
Non Quadratic Eqn

$ax + by + c = 0$

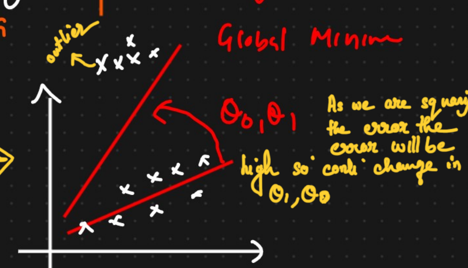
$(a-b)^2 = a^2 - 2ab + b^2$



Convex function.



$(\text{Error})^2 \longrightarrow$



Advantages

① It is differentiable

② It has one local and one global Minima

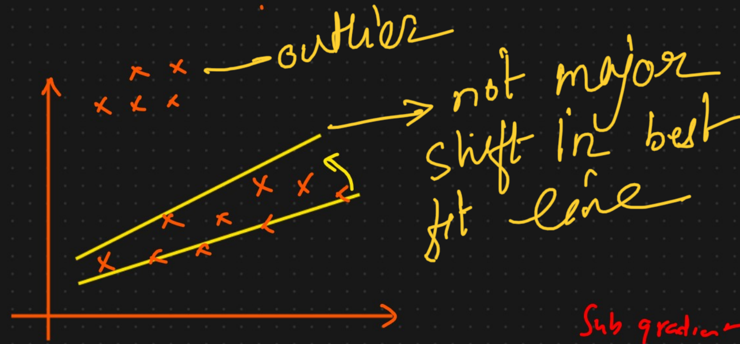
Disadvantage

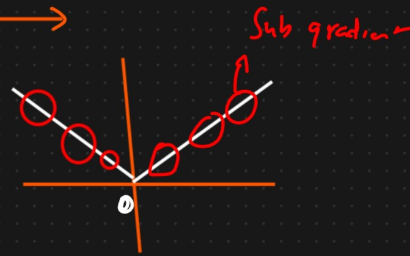
① MSE is Not Robust to Outliers

② It is not in the Same unit

② Mean Absolute Error

$$MAE = \frac{1}{n}\sum_{i=1}^{n} |y - \hat{y}|$$





Advantage

① Robust to outliers

② It will be in the same unit

Disadvantage

① Convergence usually takes time. Optimization is complex

② Time consuming

③ RMSE (Root Mean Squared Error)

$$RMSE = \sqrt{MSE}$$

$$= \sqrt{\frac{1}{n}\sum_{i=1}^{n} (y_i - \hat{y}_i)^2}$$

Advantages

① Same Unit

② Differentiable

Disadvantage

① Not Robust to outliers

Note: Linear Regression

Performance Check ⟶ R^2 and Adjusted R^2

Cost function ⟶ MSE, MAE, RMSE