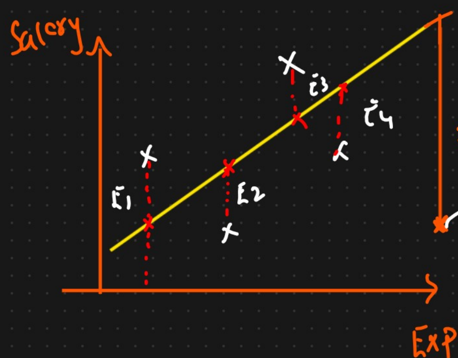
MSE, MAE, RMSE [Cost function] → Performance Metrics

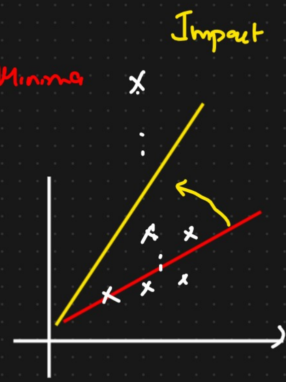
R^2 and Adjusted R^2



=) Squaring

penalizing the outliers

Exp	Salary
–	–
–	–
–	–



$\boxed{MSE\uparrow\uparrow}$

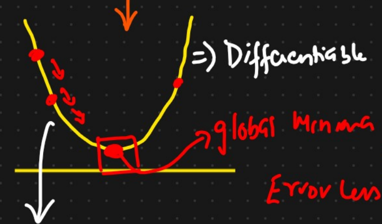
MSE

$$MSE = \frac{\sum_{i=1}^{n} (y-\hat{y})^2}{n}$$ =) Cost function ↓↓

→ Quadratic Equation

$ax+by+c$

$$\boxed{(a-b)^2 = a^2 - 2ab + b^2}$$



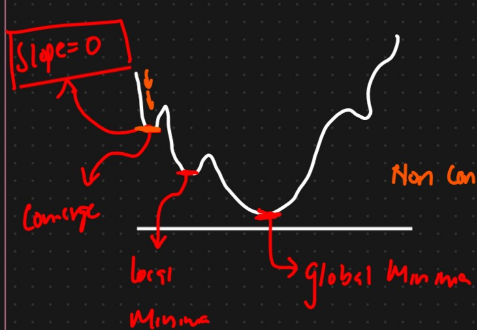
Convex function

Advantage

1. Differentiable ✓
2. It has one local and one global Minima
3. Converges faster

Disadvantage

1. Not Robust to outliers
2. It is not in same unit.



Non Convex functions

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

x	y	$(y_i-\hat{y}_i)^2$
	Salary (lakhs)	$(\text{lakh})^2$ (MSE)

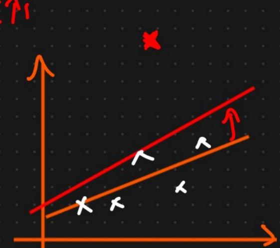
Error < 2.5 =) $(\text{lakh})^2$ ⇐

② Mean Absolute Error (MAE)

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

Lakhs

MAE↑↑



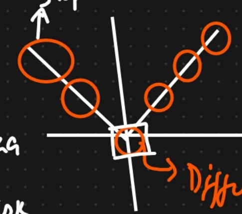
Advantage

1. Robust to outliers ✓
2. It will be in the same unit

Disadvantage

1. Convergence usually take more time. Optimiza-tion is a complex task
2. Time consuming

Slope.



Subgradient

Cannot Differentiate at 0

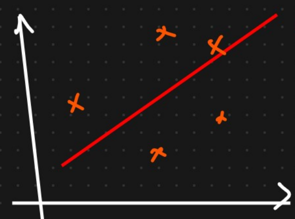
③ RMSE {Root Mean Squared Error}

$$RMSE = \sqrt{MSE}$$

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

$\boxed{\text{MAE, MSE, RMSE}}$

Performance metric



→ MSE ✓
→ MAE ✓
→ RMSE ✓
↳ R^2 ✓
↳ Adjusted R^2 ✓

Advantage

1. Same unit
2. Differentiable

Disadvantage

1. Not Robust to outliers

MSE vs MAE vs RMSE
R^2 Vs Adjusted R^2