☆ VIF (variance inflation Factor)

Independent variable should not depend on each other

$$VIF = \frac{1}{1 - R^2}$$

☆ Regularisation

$L_1$ Lasso

$L_2$ Ridge

Elasticnet Regularisation

# ① $L_1$ Lasso

when we have multiple features in data and want to reduce some unrelated fetures from data. while training algorithms.

$X_1 \quad X_2 \quad X_3 \quad X_4 \quad X_5 \quad X_6 \quad X_7 \quad X_8 \quad Y$

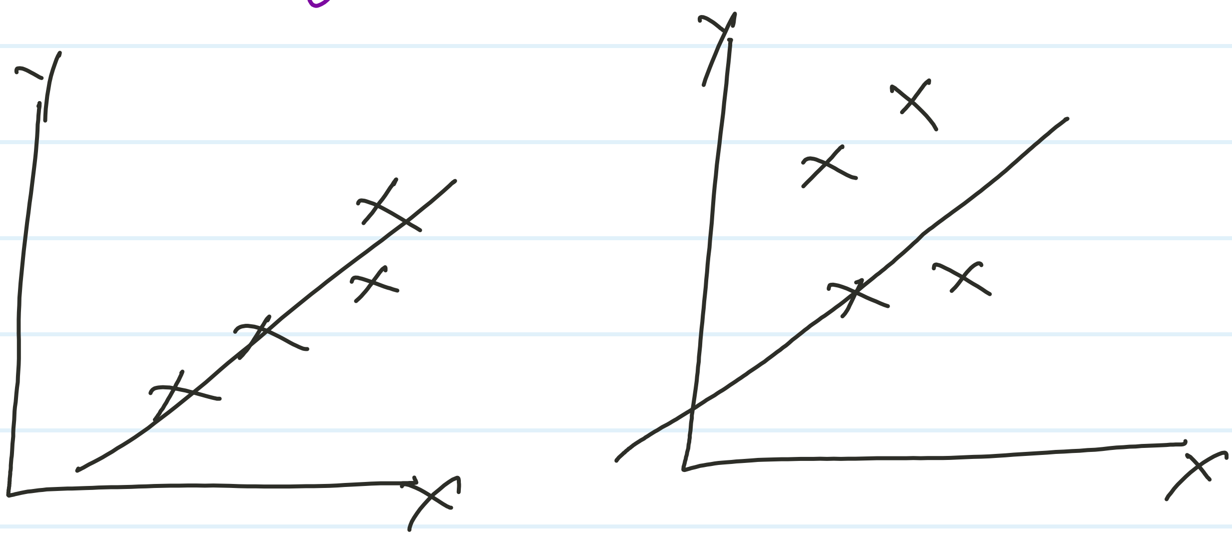
$$\Rightarrow \frac{1}{N}\sum_{i=1}^{n}\left[h_\theta(x)^i - y^i\right] + \lambda|slop|$$

$$h_\theta(x) = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 \cancel{x_3} + \theta_4 \cancel{x_4}$$

$$= \theta_0 + 0.54x_1 + 0.25X_2 + \boxed{0.01X_3} + 0.10x_4$$

# * $L_2$ Ridge Regularisation

To maintain overfitting and underfitting of model




$$L_2 = \frac{1}{n}\sum_{i=1}^{n}\left[h_\theta(x)^i - y^i\right] + \lambda(\text{slop})^2$$

Relationship of $\lambda$ and slop is inversaly proposition.

$\lambda \uparrow$ slop $\downarrow$ $\theta$

$\lambda \downarrow$ slop $\uparrow$ $\theta$

# * Elastic net Regularisation

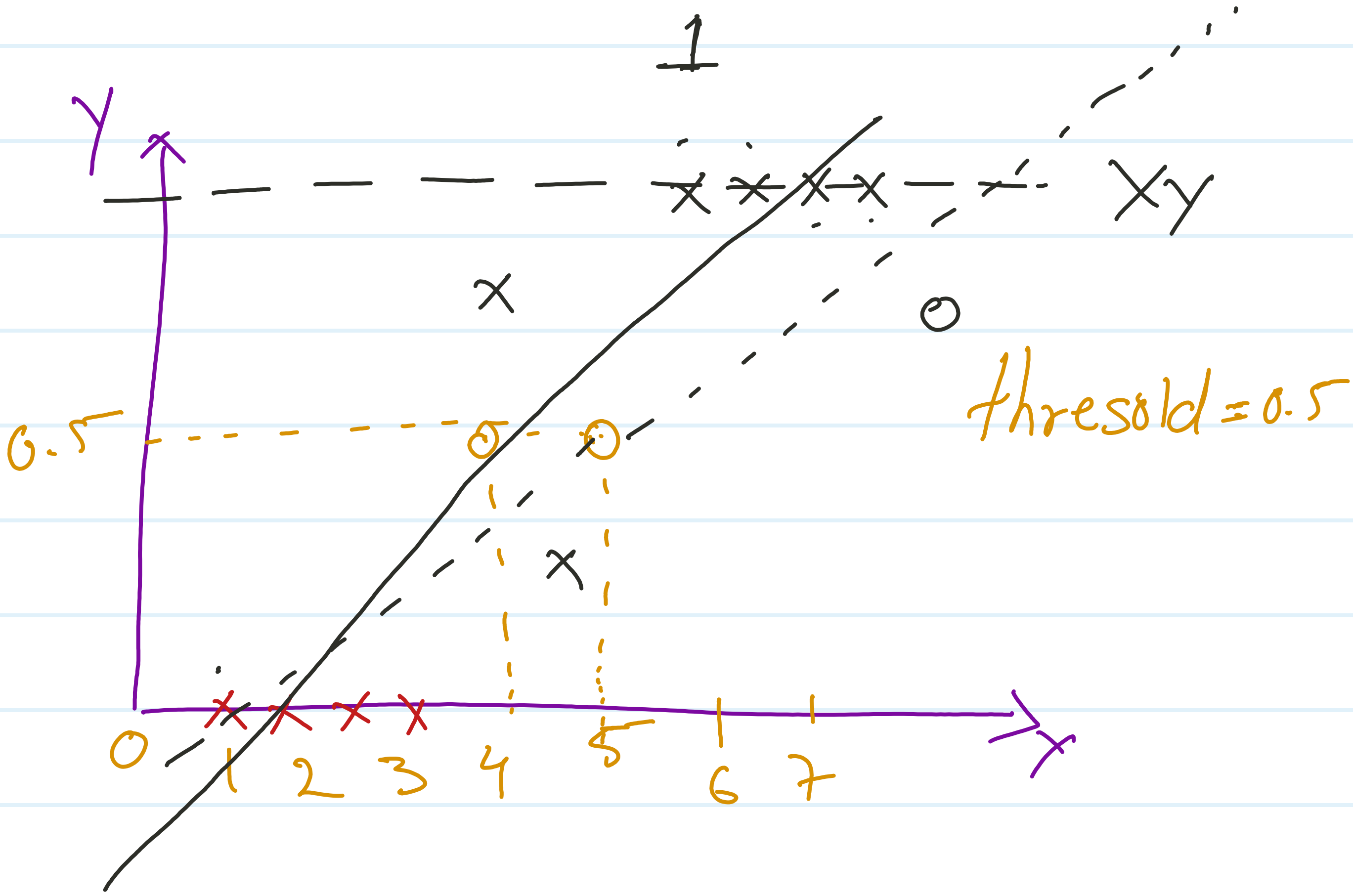
Combination of $L_1$ and $L_2$

$$EN = \frac{1}{n}\sum_{i=1}^{n}\left[h_\theta(x)^i - y^i\right] + \lambda(slop)^2 + \lambda|slop|$$

overfitting = low bias
High variance

underfitting = High variance / low variance
= High bias

# # Logistic Regression




Binary classification

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

$$\text{Sigmoid Function} = \frac{1}{1+e^{-Z}}$$

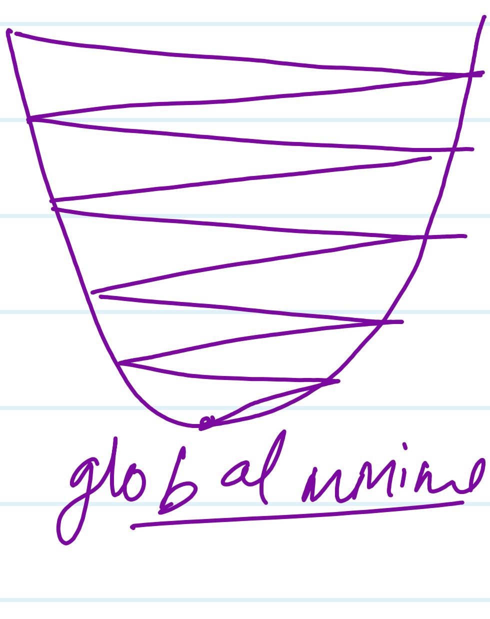
## Cost function (convax function)

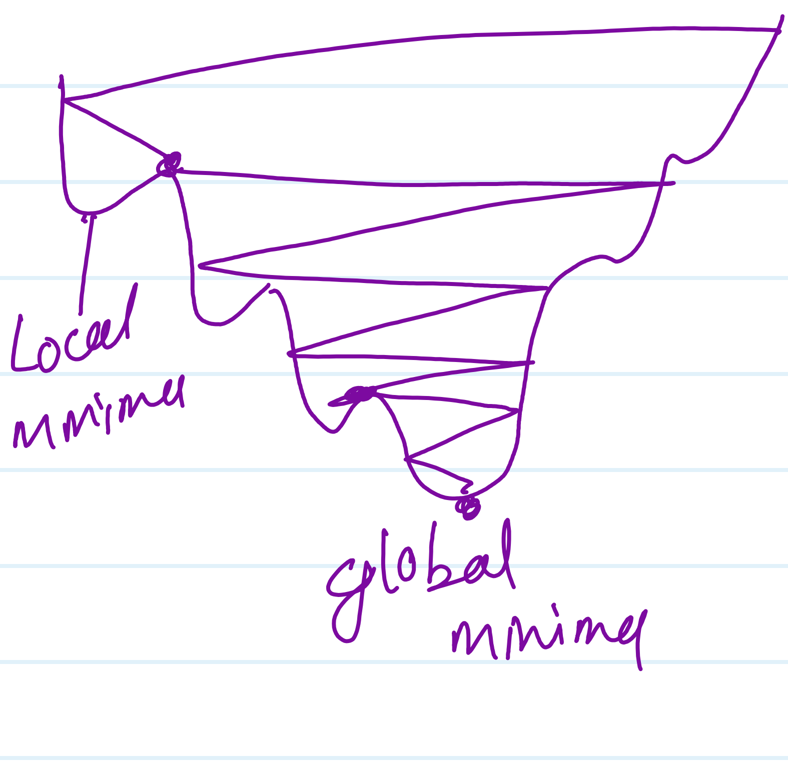
$$J(\theta_0, \theta_1) = \frac{1}{n}\sum_{i=1}^{n}\left(h_\theta(x)^i - y^i\right)^2$$

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

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

$$\frac{1}{1+e^{-z}} = \frac{1}{1+e^{-(\theta_0+\theta_1 z)}}$$



cost function of logistic regression

$$J(\theta) = \frac{1}{N} \sum_{i=1}^{n} cost(h_\theta(x), y)$$

* Repeat conversion theorem

$\{ J = 0$ and $1 \}$

$$\theta_j = \theta_j - \alpha \frac{\partial}{\partial \theta_j} \cdot j(\theta_0, \theta_1)$$

$\alpha$ = learning rate

* <u>logistic Regression</u> - Binary class
* Sigmoid function

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