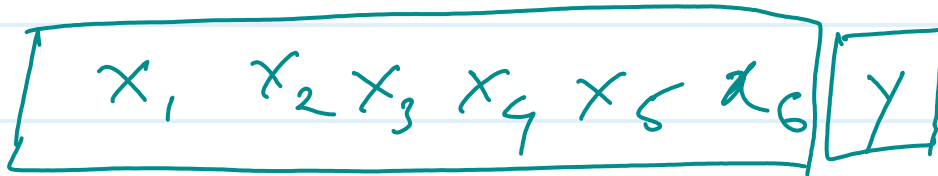


★ Feature selection or Feature reduction



★ VIF

★ Regularisation

- ① Lasso  $L_1$
- ② Ridge  $L_2$
- ③ Elasticnet Regularisation

①  $L_1$  (Lasso) -

To select feature or Reduce feature

$$L_1 = \frac{1}{m} \sum_{i=1}^m [h_{\theta}(x^i) - y^i]^2 + \lambda |slope|$$

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

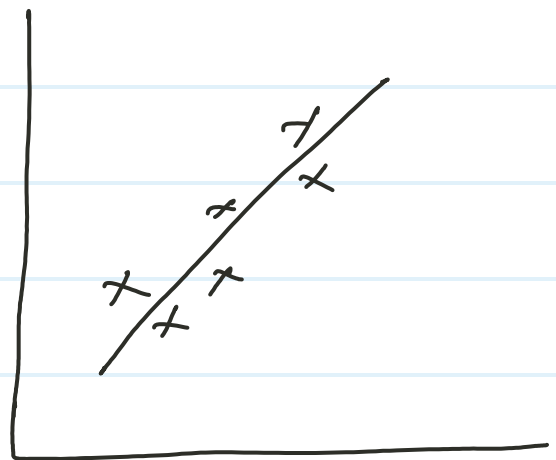
$$\Rightarrow 0.5 + 0.54x_1 + 0.25x_2 + 0.01x_3 + 0.2x_4$$

Will reduce  $\theta_3 x_3$  feature from dataset.

\*  $L_2$  Ridge -

To reduce overfitting of model

overfitting - low bias  
High variance



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

$\lambda$  hyperparameters

(1, 2, 0.5, 0.9, 3, 4 - - - -)

$$\text{slop} = \theta$$

$$y = mx + c$$

Relationship b/w  $\lambda$  and  $\theta$   
It is inversely proportional

$$\lambda \uparrow \quad \theta \downarrow$$

### ③ Elasticnet Regularisation

Combination of Ridge and Lasso

$$\text{elasticnet} = \frac{1}{m} \sum_{i=1}^m [h_{\theta}(x)^i - y^i]^2 + \lambda (\text{slope})^2 + \lambda |\text{slope}|$$

### \* Assumption of linear Regression

- ① Independent and dependent variable must be having linear relation.
- ② Mean of residual error should be zero.
- ③ Error term are not suppose to be co-related

- ④ Independent variable and residual error suppose to be uncorrelated [Exogeneity]
- ⑤ Error term must show a constant variance [Homoscedasticity]
- ⑥ No multicollinearity [ $x_1, x_2, x_3, x_4$ ]

① Line eq<sup>n</sup>  $y = mx + c$

② Cost funct.

③ Repeat conv. theorem

④ evaluation matrix

(i) MSE

(ii) MAE

(iii) RMSE

(iv)  $R^2$

(v) Adj.  $R^2$

⑤  $L_1$ ,  $L_2$  and Elasticnet Regularization

