* Feature selection or Feature reduction

$x_1 \; x_2 \; x_3 \; x_4 \; x_5 \; x_6$ | y

* VIF

* Reglarisation
  1. Lasso / L_1
  2. Ridge / L_2
  3. Elasticnet Regularisation

1. L_1 (Lasso) –
   To select Feature or Reduce feature

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

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

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

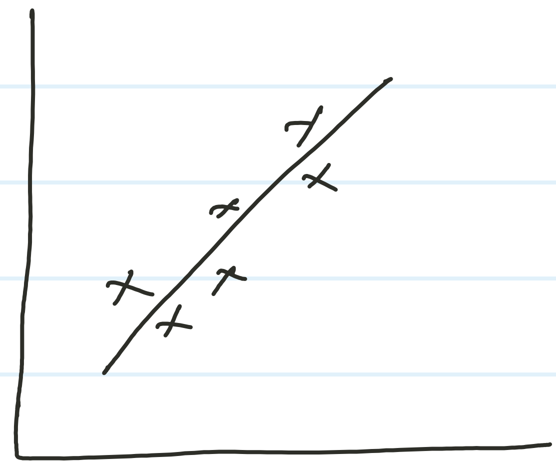
Will Reduce $\theta_3 x_3$ feature from dataset.

✱ L_2 Ridge –

To reduce overfitting of model

overfitting – low bias
High variance

overfitted



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

λ hyperparameter

$(1, 2, 0.5, 0.9, 3, 4 \text{ - - - - - })$

$\text{slop} = \theta$

$y = mx + c$

Relationship b/w λ and θ
It is inversaly propotional

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

③ Elasticnet Regularisation

Combination of Ridge and Lasso

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

✱ 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 un-correlated [Exogenety]

⑤ Error term must showcase constant varience [Homoscedasity]

⑥ No multicolinearity $[x_1, x_2, x_3, x_4]$

① Line eqn $y = mx + c$

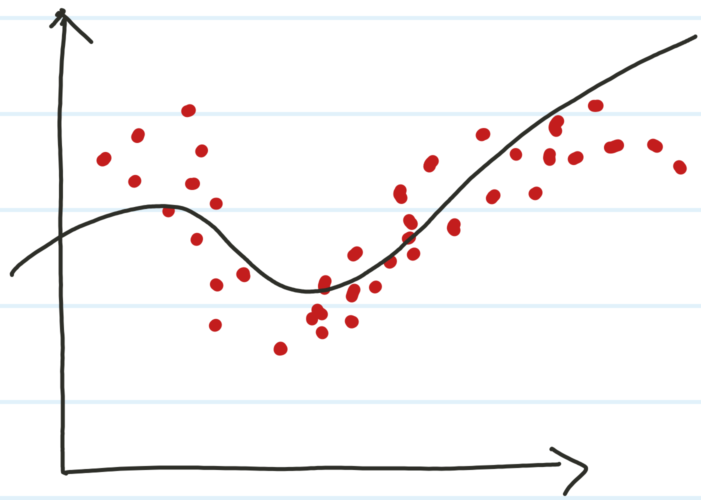
② Cost funct.

③ Repeat conv. therom

④ evaluation matrix
  - (I) MSE
  - (II) MAE
  - (III) RMSE
  - (V) R^2
  - (VI) Adj. R^2

⑤ L_1, L_2 and elasticnet Regularization

☆ Polynomial Regression



Simple $\quad Y = mx + c + \epsilon$

OR

multi

$$Y = c + m_1 x_1 + m_2 x_2^2 + m_3 x_3^3 + \cdots + m_n x_n^n + \epsilon$$

ϵ = Error term