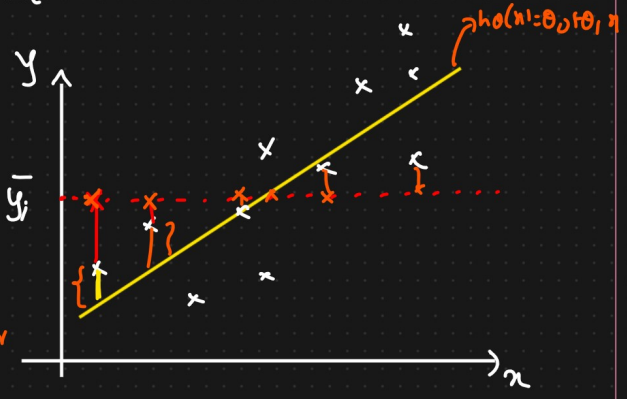
# Performance Metrics Used In Regression

① R Squared ② Adjusted R Squared




## ① R Squared

$$R_{squared} = 1 - \frac{SS_{Res}}{SS_{Total}}$$

$SS_{Res}$ → Error

$SS_{Total}$ → {Average of $y_i$'s} → Error

$SS_{Res}$ = Sum of Square Residual {Error}

$SS_{Total}$ = Sum of Square Total

$SS_{Res}$ ↗

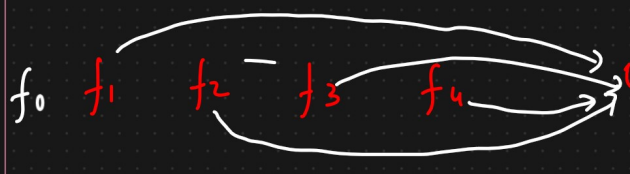
$$R\ Squared = 1 - \frac{\sum_{i=1}^{n} (y_i - h_\theta(x))^2}{\sum_{i=1}^{n} (y_i - \bar{y}_i)^2}$$

$\sum (y_i - h_\theta(x))^2$ ⇒ Small

$\sum (y_i - \bar{y}_i)^2$ ⇒ Big

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

R Squared ranges between 0 to 1



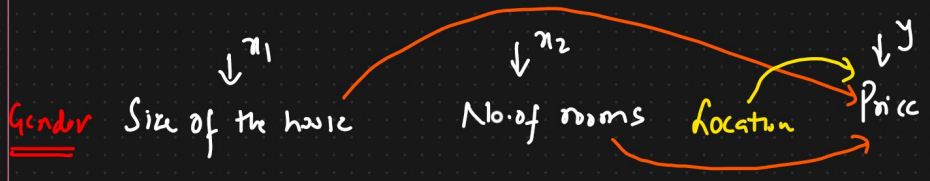

R squared = 75% = 0.75

R Squared = 80%

R Squared = 90% ↑↑↑

R Squared = 92% 77

## ② Adjusted R squared




R-squared = 85% = 0.85

R-squared = 90% = 0.90

R-squared = 91% = 0.91

$$\text{Adjusted R Square} = 1 - \frac{(1-R^2)(N-1)}{N-p-1}$$

N = no. of datapoints

$R^2$ = R squared

P = No. of Independent features.

$R^2 = 0.8$ $N = 11$ $p = 2$ $p = 3$ → feature

$$\text{Adjusted R squared} = 1 - \frac{[(0.2)(10)]}{11-2-1} = 0.75$$

$R^2 >> \text{Adjusted } R^2$

$R^2 = 80\%$ Adjusted $R^2 = 75\%$

$p = 3$ $R^2 = 85\%$ Adjusted $R^2 = 78\%$

p=4 ↑↑ $R^2$ = 87% Adjusted $R^2$ = 76% ↓↓

⇓

Independent feature is not that important