Date

Maths behind Redge Regression

where m = slope..

$$\boxed{L = \sum_{i=1}^{n} (Y_i - \hat{Y_i})^2 + \lambda m^2}$$

$$\boxed{b = \bar{Y} - m\bar{X}}$$

$$L = \sum_{i=1}^{n} (Y_i - mX_i - b)^2 + \lambda m^2$$

$$\frac{\partial L}{\partial m} = L = \sum_{i=1}^{n} (Y_i - mX_i - \bar{Y} + m\bar{X})^2 + \lambda m^2$$

$$\frac{\partial L}{\partial m} \Rightarrow 2\sum_{i=1}^{n} (Y_i - mX_i - \bar{Y} + m\bar{X})(-X_i + \bar{X}) + 2\lambda m = 0$$

$$\Rightarrow -\cancel{2}\sum_{i=1}^{n} (Y_i - \hat{Y} - mX_i + m\bar{X}) \cdot (X_i - \bar{X}) + \cancel{2}\lambda m = 0$$

$$\Rightarrow \lambda m - \sum_{i=1}^{n} \left[(Y_i - \bar{Y}) - m(X_i - \bar{X})\right] \cdot (X_i - \bar{X}) = 0$$

$$\Rightarrow \lambda m \sum_{i=1}^{n} (Y_i - \bar{Y})(X_i - \bar{X}) - m(X_i - \bar{X})^2 = 0$$

$$\Rightarrow \lambda m - \sum_{i=1}^{n} (Y_i - \bar{Y})(X_i - \bar{X}) + m(X_i - \bar{X})^2 = 0$$

$$\Rightarrow \lambda m + m\sum_{i=1}^{n} (X_i - \bar{X})^2 = \sum_{i=1}^{n} (Y_i - \bar{Y})(X_i - \bar{X})$$

$$\boxed{m = \frac{\sum_{i=1}^{n} (Y_i - \bar{Y})(X_i - \bar{X})}{\sum_{i=1}^{n} (X_i - \bar{X})^2 + \lambda}}$$

$\boxed{\text{hyper parameter}}$ also Known as "alpha"

As the Value of $\boxed{\lambda}$ Alpha Increases, the Value of 'm' decreases....