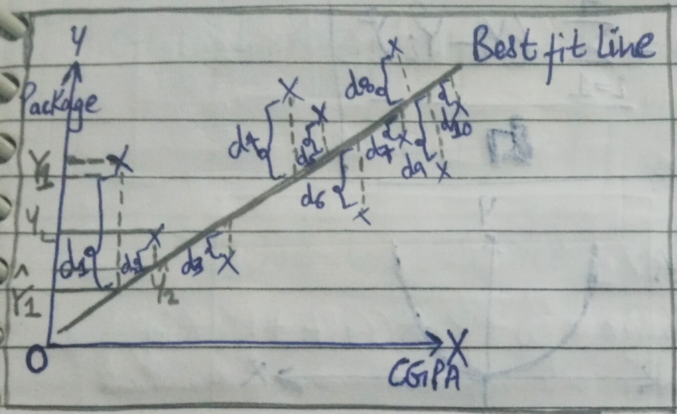
Date.................

Types of Efficiency Scores...

1. mae or Mean Absolute Error



- As per the mae or Mean Absolute Error the mae is defined as the mod of $|Y_i - \hat{Y}_i|$.

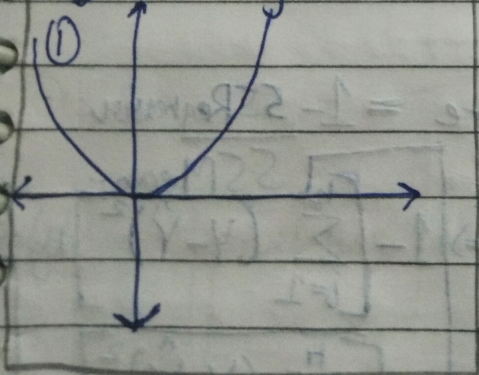
- So $mae = |Y_1 - \hat{Y}_1| + |Y_2 - \hat{Y}_2|$ ..... $|Y_n - \hat{Y}_n|$

$$\boxed{mae = \frac{\sum_{i=1}^{n} |Y_i - \hat{Y}_i|}{n}}$$

Advantages:-

1. It provides the answer or value in terms of Y or Package. So it is easy to understand and take changes.
2. It is robust with the Outliers..

Disadvantages:-

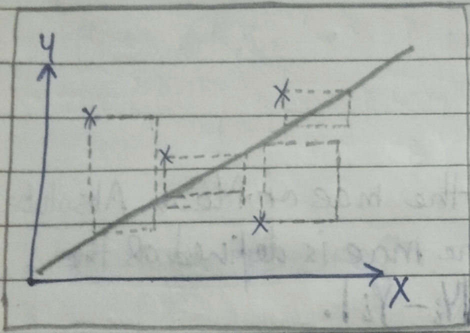


- As it is the mod of the values. So the graph of mod is not Deferentiate at zero '0' axis...

- Therefore it is not deferentiated at '0'...

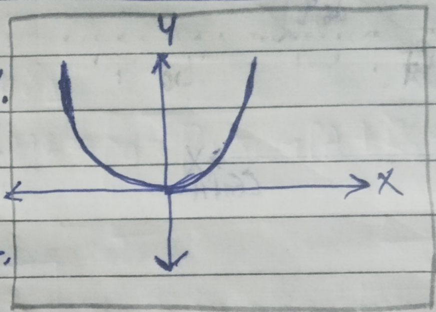
Date..........

② mse or Mean Squared Error



• In mse the difference is that in the formula is:-

$$mse = \frac{\sum_{i=1}^{n} (Y_i - \hat{Y_i})^2}{n}$$



Advantages:-

① Same, as it gives the value in terms of Y.
② It is differentiated at all the values.

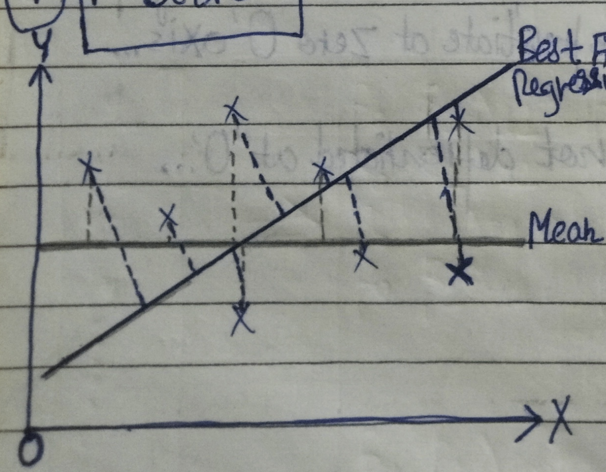
Disadvantages:-

① It is difficult to maniplate the answer.
② It is not robust with the outliers.

③ rmse or Root over of Mean Squared Error

• It is the root of mse ⇒ $\sqrt{\frac{\sum_{i=1}^{n} (Y_i - \hat{Y_i})^2}{n}}$

④ r^2 Score



r^2 Score $= 1 - \frac{SS_{Regression}}{SS_{Mean}}$

$$\Rightarrow 1 - \frac{\left[\sum_{i=1}^{n} (Y - \hat{Y})^2\right]_{Regression}}{\left[\sum_{i=1}^{n} (Y - \hat{Y})^2\right]_{Mean}}$$

$$\boxed{0 < R_2 < 1}$$

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(5) Adjusted R2 Score

Q Why we are including the adjusted R2 Score when we have the R2 Score?

Ans let say we have 2 columns as data.

CGPA	Package	iq	temp

Actual_Data_Updated

- Adding one more column to our data will increase the variance logic about the data.
- I have added "iq" column in my data. This leads to Increase in Variance.
- But let's say if I have added a column which is having no relevance with the output column. For example ⇒ If I add "temperature" to this data.
- This also increase the Variance or providing no change. But actually this leads to ↓ in the Variance.

∴ So, R2 Score cannot do this, therefore Adjusted R2 Score come...

$$\boxed{R2_{Adjusted} = 1 - \left[\frac{(1-R2)*(n-1)}{(n-1-K)}\right]}$$

where ⇒ R2 = R2 Score
n = Number of Rows
K = Number of Input Columns, let's say Currently, K = 3 [CGPA, iq, temp]

Adding "temperature" Column

⇓

$\boxed{R2_{Adjusted} \text{ will Decrease} \downarrow}$

Adding "iq" Column

⇓

$\boxed{R2_{Adjusted} \text{ will Increase} \uparrow}$

Spiral