

Que1:

- Explain all regression evaluation metrics.

There are mainly three metrics on the basis of which we can evaluate performance of regression model. They are:

- Mean Squared Error (MSE).
- Root Mean Squared Error (RMSE).
- Mean Absolute Error (MAE).

Mean Squared Error(MSE):

The MSE is calculated as the mean or average of the squared differences between predicted and expected target values in a dataset.

- $MSE = 1 / N * \sum \text{for } i \text{ to } N (y_i - \hat{y}_i)^2$

Where y_i is the i 'th expected value in the dataset and \hat{y}_i is the i 'th predicted value. The difference between these two values is squared, which has the effect of removing the sign, resulting in a positive error value.

Root Mean Squared Error(RMSE)

The [Root Mean Squared Error](#), or RMSE, is an extension of the mean squared error. Importantly, the square root of the error is calculated, which means that the units of the RMSE are the same as the original units of the target value that is being predicted.

For example, if your target variable has the units “*dollars*,” then the RMSE error score will also have the unit “*dollars*” and not “*squared dollars*” like the MSE.

As such, it may be common to use MSE loss to train a regression predictive model, and to use RMSE to evaluate and report its performance.

The RMSE can be calculated as follows:

- $RMSE = \sqrt{1 / N * \sum \text{for } i \text{ to } N (y_i - \hat{y}_i)^2}$

Where y_i is the i 'th expected value in the dataset, \hat{y}_i is the i 'th predicted value, and $\sqrt{}$ is the square root function

Mean Absolute Error(MAE):

Mean Absolute Error, or MAE, is a popular metric because, like RMSE, the units of the error score match the units of the target value that is being predicted.

Unlike the RMSE, the changes in MAE are linear and therefore intuitive.

That is, MSE and RMSE punish larger errors more than smaller errors, inflating or magnifying the mean error score. This is due to the square of the error value. The MAE does not give more or less weight to different types of errors and instead the scores increase linearly with increases in error.

As its name suggests, the MAE score is calculated as the average of the absolute error values.

Absolute or *abs()* is a mathematical function that simply makes a number positive. Therefore, the difference between an expected and predicted value may be positive or negative and is forced to be positive when calculating the MAE.

The MAE can be calculated as follows:

- $MAE = 1 / N * \sum \text{for } i \text{ to } N \text{ abs}(y_i - \hat{y}_i)$

Where y_i is the i 'th expected value in the dataset, \hat{y}_i is the i 'th predicted value and *abs()* is the absolute function

Que:2

- Explain Why Mean squared error is taken as cost function in regression problems.

Mean Squared Error is the sum of the squared differences between the prediction and true value. And the output is a single number representing the **cost**. So the line with the minimum cost function or MSE represents the relationship between X and Y in the best possible manner. And once we have the slope and intercept of the line which gives the least error, we can use that line to predict Y.