Evaluating Model Performance: Takeaways

Syntax

- Calculating the (mean squared error) MSE:

```
test_df['squared_error'] = (test_df['predicted_price'] - test_df['price'])**(2)

mse = test_df['squared_error'].mean()
```

- Calculating the (mean absolute error) MAE:

```
test_df['squared_error'] = np.absolute(test_df['predicted_price'] - test_df['price'])

mae = test_df['squared_error'].mean()
```

- Calculating the root mean squared error (RMSE):

```
test_df['squared_error'] = (test_df['predicted_price'] - test_df['price'])**(2)

mse = test_df['squared_error'].mean()

rmse = mse ** (1/2)
```

Concepts

- A machine learning model outputs a prediction based on the input to the model.
- When you're beginning to implement a machine learning model, you'll want to have some kind of validation to ensure your machine learning model can make accurate predictions on new data.
- You can test the quality of your model by:
    - Splitting the data into two sets:
        - The training set, which contains the majority of the rows (75%).
        - The test set, which contains the remaining rows (25%).
    - Using the rows in the training set to predict the values for the rows in the test set.
    - Comparing the actual values with the predicted values to see how accurate the model is.

- To quantify how good the predictions are for the test set, you would use an error metric. The error metric quantifies the difference between each predicted and actual value and then averaging those differences.
    - This is known as the mean error but isn't effective in most cases because positive and negative differences are treated differently.
- The MAE computes the absolute value of each error before we average all the errors.
- Let n be the number of observations then the MAE equation is as follows:

$$MAE = \frac{1}{n}\sum_{k=1}^{n} |(actual_1 - predicted_1)| + \ldots + |(actual_n - predicted_n)|$$

- The MSE makes the gap between the predicted and actual values more clear by squaring the difference of the two values.
- Let n be the number of observations then the MSE equation is as follows:

$$MSE = \frac{1}{n}\sum_{k=1}^{n} (actual_1 - predicted_1)^2 + \ldots + (actual_n - predicted_n)^2$$

- RMSE is an error metric whose units are the base unit, and is calculated as follows:

$$RMSE = \sqrt{\frac{1}{n}\sum_{k=1}^{n} (actual_1 - predicted_1)^2 + \ldots + (actual_n - predicted_n)^2}$$

- In general, the MAE value is expected to be be much less than the RMSE value due the sum of the squared differences before averaging.

Resources

- MAE and RMSE comparison
- About Train, Validation, and Test Sets in Machine Learning