

Introduction to Metrics in Machine Learning

Metrics are essential for evaluating the performance of machine learning models. They provide objective measures to assess how well a model is performing on a given task.



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Regression Metrics

Regression metrics measure the accuracy of a model's predictions for continuous values. Common regression metrics include Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE).

MSE

Calculates the average squared difference between the predicted values and the actual values.

RMSE

The square root of the MSE, providing a measure of error in the same units as the target variable.

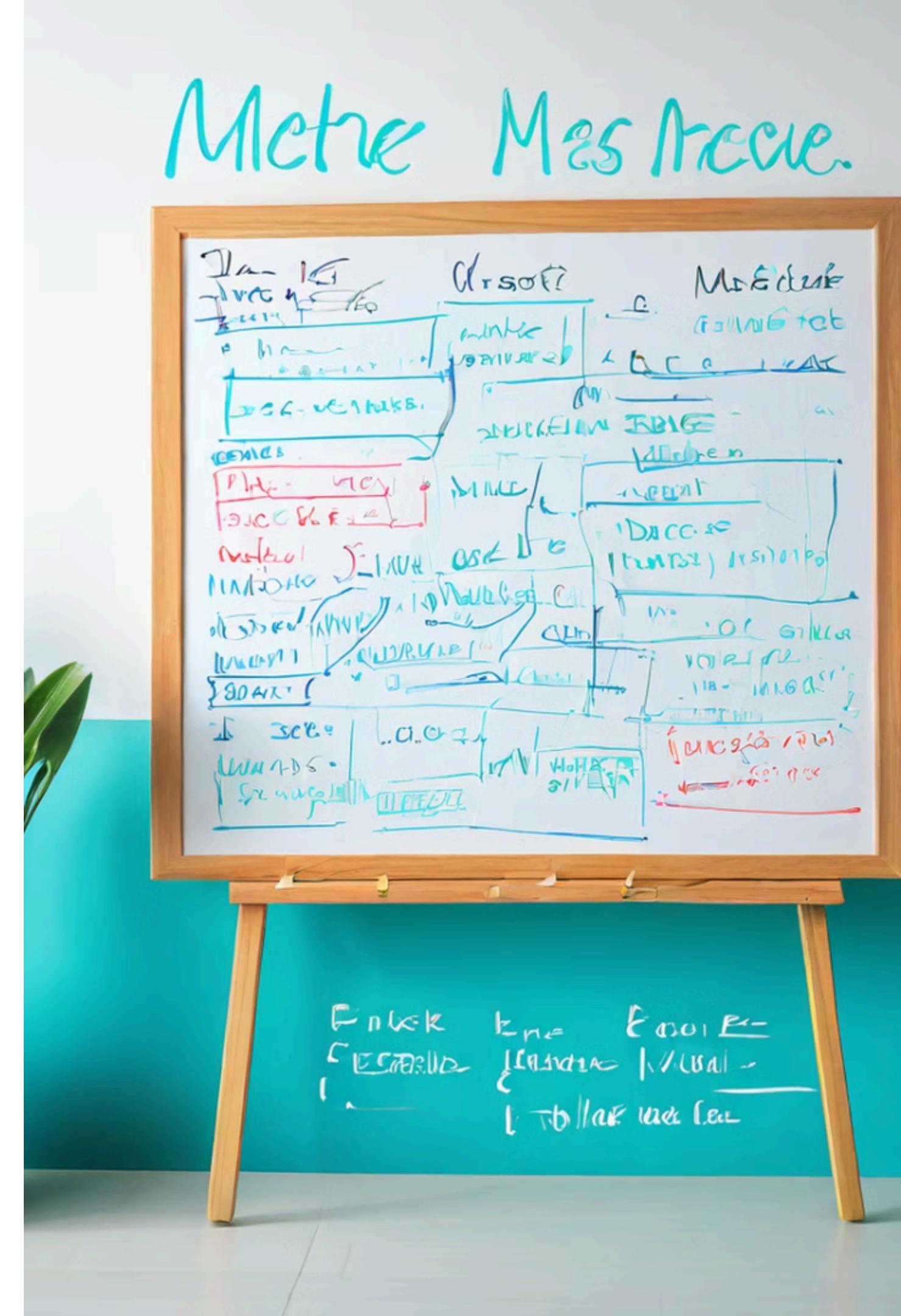
MAE

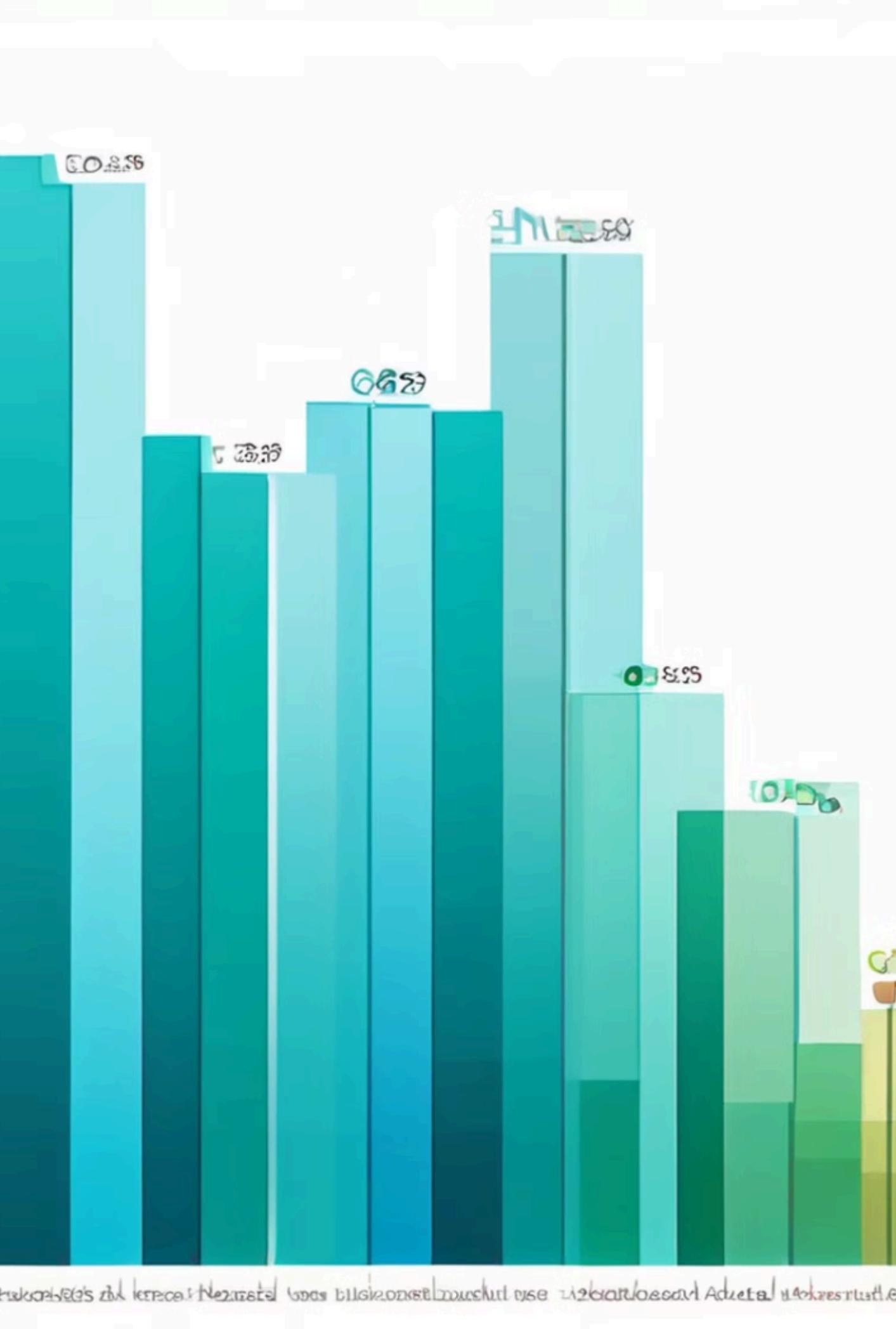
Calculates the average absolute difference between the predicted values and the actual values.

Regression Metrics Formulas

These formulas help quantify the error in a regression model's predictions.

Metric	Formula
MSE	$1/n * \sum(y_i - \hat{y}_i)^2$
RMSE	$\sqrt{1/n * \sum(y_i - \hat{y}_i)^2}$
MAE	$1/n * \sum y_i - \hat{y}_i $





Classification Metrics

Classification metrics measure the accuracy of a model's predictions for categorical values. They assess how well a model can classify data into distinct categories.

1 Accuracy

The proportion of correct predictions made by the model.

3 Recall

The proportion of correctly predicted positive instances among all actual positive instances.

2 Precision

The proportion of correctly predicted positive instances among all instances predicted as positive.

4 F1-Score

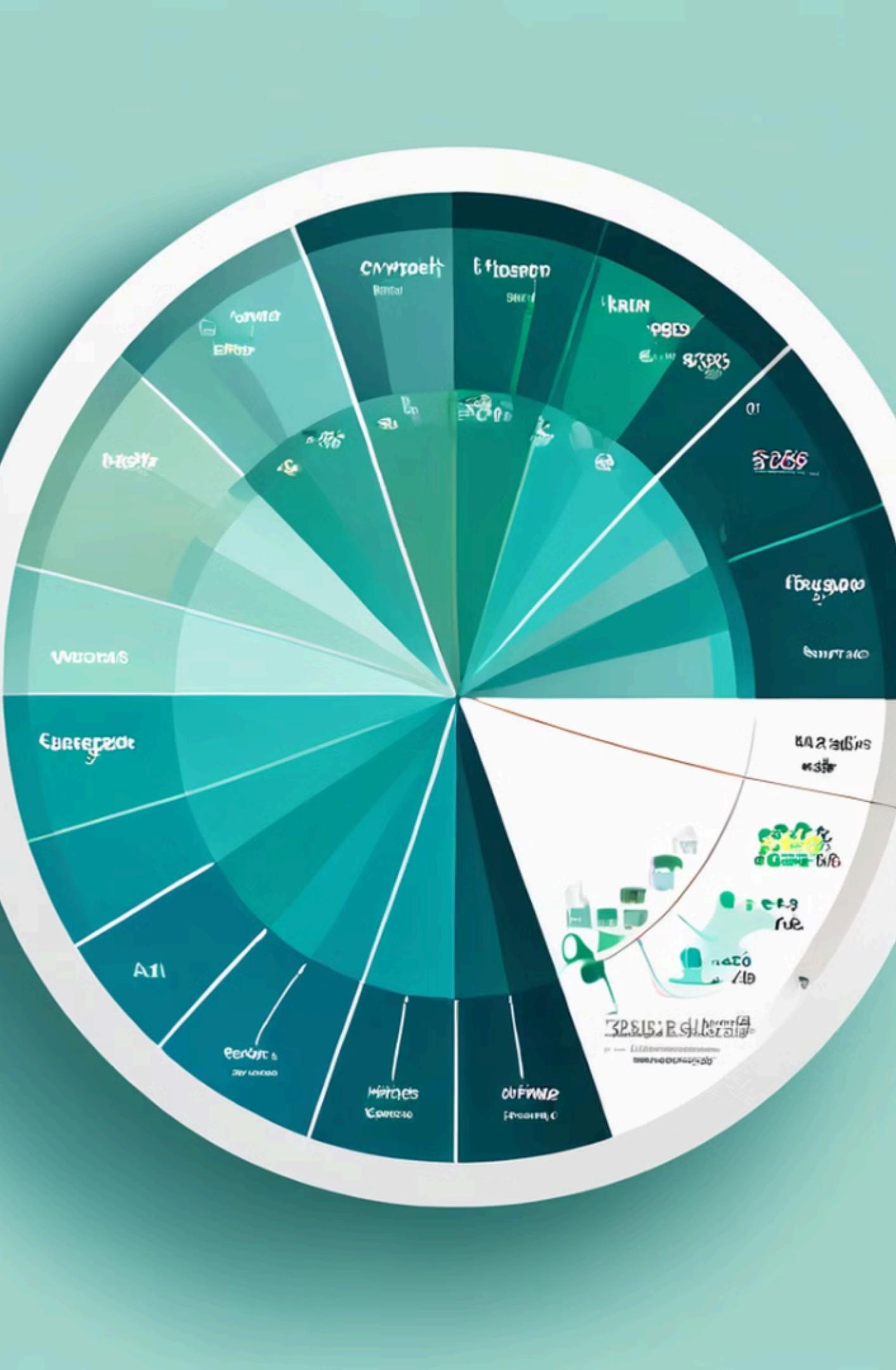
The harmonic mean of precision and recall, providing a balanced measure of a model's performance.

Classification Metrics Formulas

These formulas are used to calculate the performance of classification models.

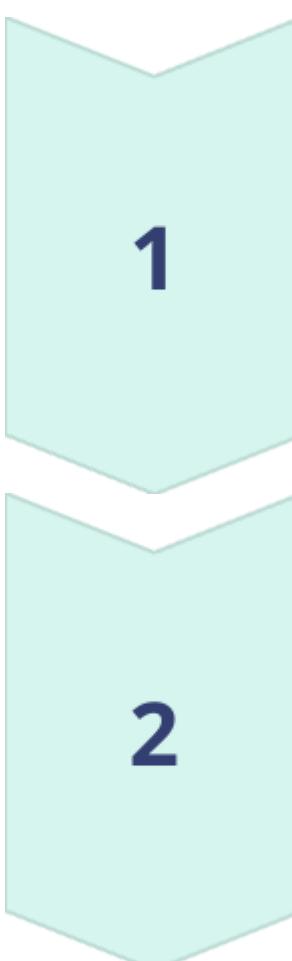
Metric	Formula
Accuracy	$(TP + TN) / (TP + TN + FP + FN)$
Precision	$TP / (TP + FP)$
Recall	$TP / (TP + FN)$
F1-Score	$2 * (\text{Precision} * \text{Recall}) / (\text{Precision} + \text{Recall})$





Accuracy and Precision

Accuracy measures the overall correctness of a model's predictions, while precision focuses on the accuracy of positive predictions.

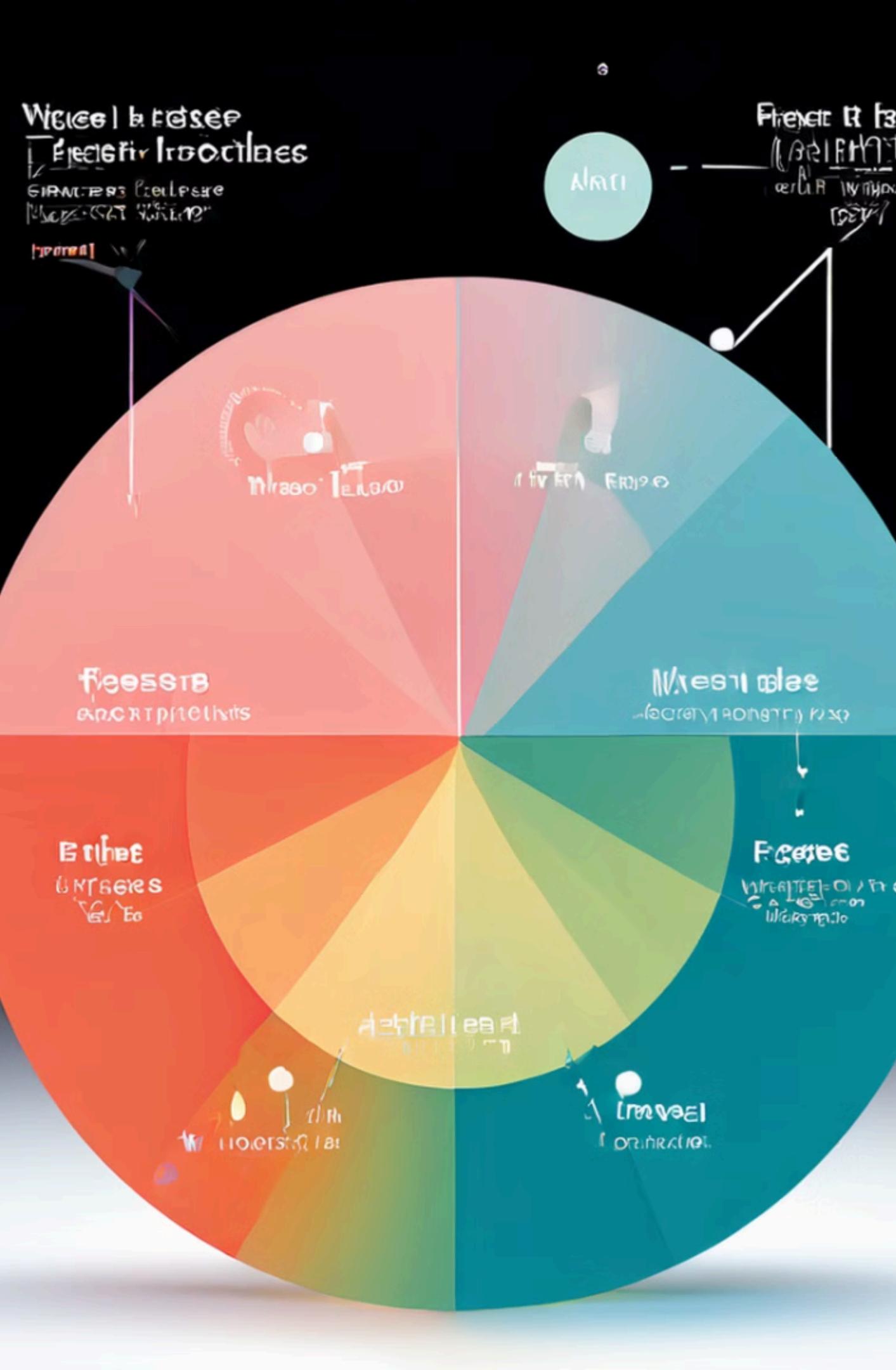


Accuracy

The percentage of correct predictions.

Precision

The ratio of correctly predicted positive instances to all predicted positive instances.



Recall and F1-Score

Recall measures the model's ability to identify all positive instances, while the F1-score balances precision and recall.



Recall

The ratio of correctly predicted positive instances to all actual positive instances.



F1-Score

The harmonic mean of precision and recall.



Conclusion and Key Takeaways

Metrics play a crucial role in machine learning, providing a standardized way to evaluate model performance. By understanding and applying appropriate metrics, data scientists can improve model accuracy and effectively communicate results.