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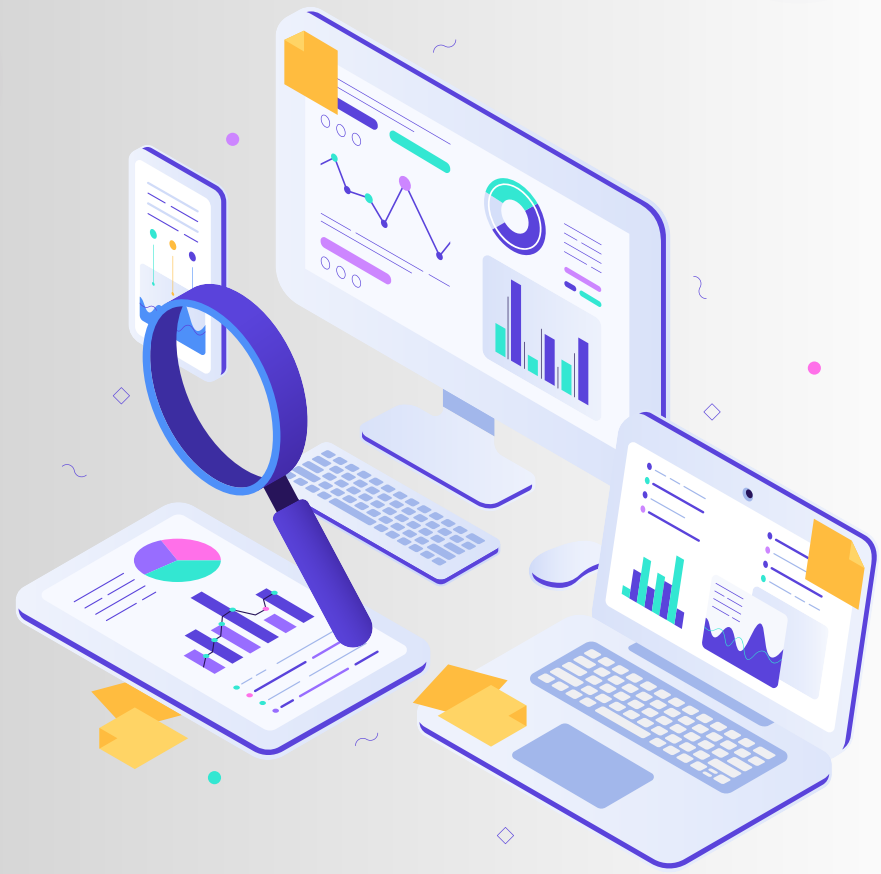
INTRODUCTION TO MODEL EVALUATION AND METRICS



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Accuracy

Accuracy is a fundamental metric used to assess how well a model predicts the correct class labels. It's calculated as follows:

Accuracy = (Number of Correct Predictions) / (Total Number of Predictions)

```
from sklearn.metrics import accuracy_score

true_labels = [0, 1, 1, 0, 1]
predicted_labels = [0, 1, 1, 1, 1]

accuracy = accuracy_score(true_labels, predicted_labels)
print("Accuracy:", accuracy)
```

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Precision

Precision indicates the accuracy of positive predictions made by the model. It's especially useful when the cost of false positives is high. Precision is calculated as follows:

Precision = (True Positives) / (True Positives + False Positives)

```python
from sklearn.metrics import precision_score

true_labels = [1, 0, 1, 0, 1]
predicted_labels = [1, 1, 0, 1, 1]

precision = precision_score(true_labels, predicted_labels)
print("Precision:", precision)
```

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Recall (Sensitivity)

Recall, also known as Sensitivity or True Positive Rate, measures the ability of the model to identify positive instances. It's calculated as follows:

Recall = (True Positives) / (True Positives + False Negatives)

```python
from sklearn.metrics import recall_score

true_labels = [1, 0, 1, 0, 1]
predicted_labels = [1, 1, 0, 1, 1]

recall = recall_score(true_labels, predicted_labels)
print("Recall:", recall)
```

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F1-Score

The F1-Score is the harmonic mean of precision and recall, providing a balance between the two metrics. It's useful when there's an uneven class distribution. F1-Score is calculated as follows:

F1-Score = 2 * ((Precision * Recall) / (Precision + Recall))

```python
from sklearn.metrics import f1_score

true_labels = [1, 0, 1, 0, 1]
predicted_labels = [1, 1, 0, 1, 1]

f1 = f1_score(true_labels, predicted_labels)
print("F1-Score:", f1)
```

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Confusion Matrix

The Confusion Matrix is a powerful tool for visualizing a model's performance. It shows the true positive, true negative, false positive, and false negative counts.

```python
from sklearn.metrics import confusion_matrix

y_true = [1, 0, 1, 0, 1]
y_pred = [1, 1, 0, 1, 1]

conf_matrix = confusion_matrix(y_true, y_pred)
print("Confusion Matrix:\n", conf_matrix)
```

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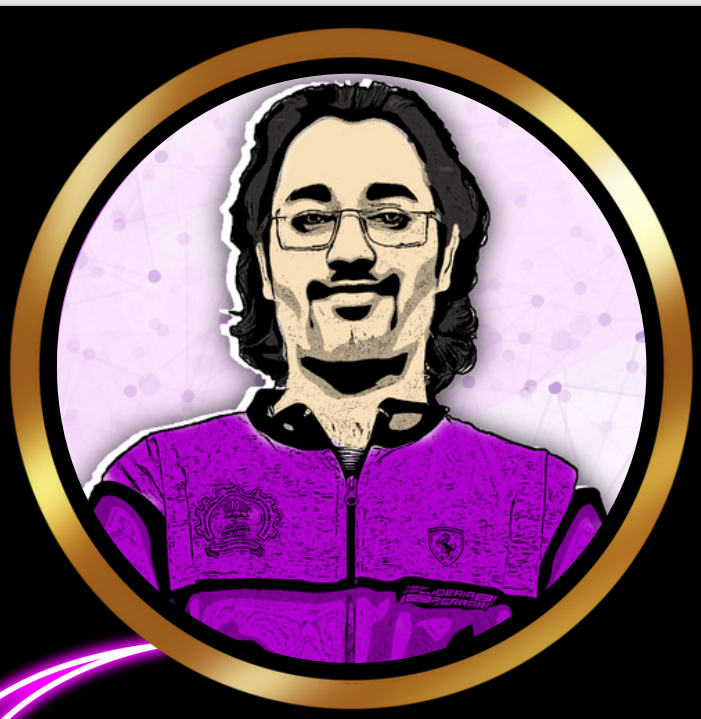

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