

Logistic Regression - Student Learning Guide

1. Key Classification Metrics

In classification tasks, we evaluate how well a model performs using key metrics:

- Accuracy
- Precision
- Recall
- F1 Score
- Confusion Matrix

2. Accuracy

Accuracy:

The proportion of total predictions that were correct.

Formula: $(TP + TN) / (TP + TN + FP + FN)$

Use when: Classes are balanced and all errors are equally important.

3. Precision

Precision:

Of all the predictions the model made as 'positive', how many were correct?

Formula: $TP / (TP + FP)$

Use when: False positives are costly (e.g., overdiagnosis).

4. Recall

Recall (Sensitivity):

Of all actual positives, how many did the model identify correctly?

Formula: $TP / (TP + FN)$

Use when: False negatives are costly (e.g., missed diagnoses).

5. F1 Score

F1 Score:

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The harmonic mean of precision and recall.

Formula: $2 * (\text{Precision} * \text{Recall}) / (\text{Precision} + \text{Recall})$

Use when: You want a balance between precision and recall.

6. Confusion Matrix

Confusion Matrix:

A 2x2 table showing true vs. predicted values:

		Predicted	
		0	1
Actual	0	TN	FP
	1	FN	TP

Use it to manually derive all metrics and understand error types.