

ROC & AUC

Precision = TP / (TP+FP)

TRUE POSITIVE	FALSE POSITIVE 误报
FALSE NEGATIVE 漏报	TRUE NEGATIVE

RECALL == TP Rate = TP / (TP+FN)

TRUE POSITIVE	FALSE POSITIVE 误报
FALSE NEGATIVE 漏报	TRUE NEGATIVE

FP Rate = FP / (FP+TN)

TRUE POSITIVE	FALSE POSITIVE 误报
FALSE NEGATIVE 漏报	TRUE NEGATIVE

The figure displays a Receiver Operating Characteristic (ROC) curve. The y-axis is labeled 'TP Rate' and the x-axis is labeled 'FP Rate', both ranging from 0 to 1. A dashed blue curve starts at (0,0) and rises towards (1,1). Two callout boxes point to specific points on the curve: 'TP vs. FP rate at one decision threshold' and 'TP vs. FP rate at another decision threshold'. An inset in the bottom right shows the entire area under the curve shaded in gray, representing the Area Under the Curve (AUC).

An ROC curve plots TPR vs. FPR at different classification thresholds. Lowering the classification threshold classifies more items as positive, thus increasing both False Positives and True Positives. The following figure shows a typical ROC curve.

To compute the points in an ROC curve, we could evaluate a logistic regression model many times with different classification thresholds, but this would be inefficient. Fortunately, there's an efficient, sorting-based algorithm that can provide this information for us, called AUC.

AUC stands for "Area under the ROC Curve." That is, AUC measures the entire two-dimensional area underneath the entire ROC curve (think integral calculus) from (0,0) to (1,1). AUC provides an aggregate measure of performance across all possible classification thresholds. One way of interpreting AUC is as the probability that the model ranks a random positive example more highly than a random negative example.