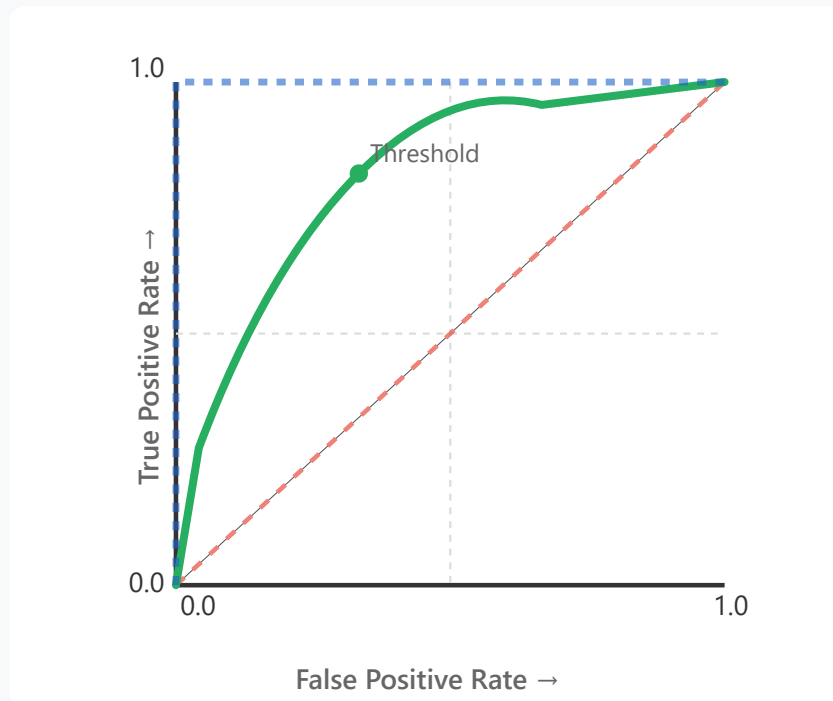


## ROC Curve and AUC

### ROC Curve Visualization



— Perfect (AUC=1.0)    — Good (AUC≈0.85)    — Random (AUC=0.5)

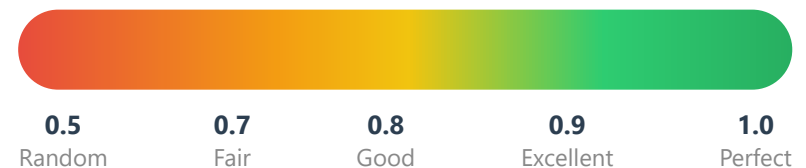
### ROC Curve

Plots TPR vs FPR at various classification thresholds. Shows model performance across all possible threshold settings.

### AUC Score

Area Under the ROC Curve. Single number (0.5 to 1.0) summarizing overall classification performance.

### AUC Interpretation Scale



### ✦ Key Advantages

Threshold-independent metric

Robust to class imbalance

Easy model comparison

# ROC Curve Construction: Step-by-Step Guide

1

## Predicted Probabilities and Actual Labels

Sample	Predicted Probability	Actual Label
A	0.95	1 (Positive)
B	0.85	1 (Positive)
C	0.75	0 (Negative)
D	0.65	1 (Positive)
E	0.55	0 (Negative)
F	0.45	0 (Negative)
G	0.35	1 (Positive)
H	0.15	0 (Negative)

2

## Calculate TPR and FPR at Each Threshold

### Threshold = 0.80

Confusion Matrix		
	A+	A-
P+	TP 2	FP 0
P-	FN 2	TN 4

TPR

$$2 / (2+2) = 0.5$$

### Threshold = 0.60

Confusion Matrix		
	A+	A-
P+	TP 3	FP 1
P-	FN 1	TN 3

TPR

$$3 / (3+1) = 0.75$$

### Threshold = 0.40

Confusion Matrix		
	A+	A-
P+	TP 4	FP 2
P-	FN 0	TN 2

TPR

$$4 / (4+0) = 1.0$$

50%

FPR

 $0 / (0+4) = 0.0$  (0.00, 0.50)

75%

FPR

 $1 / (1+3) = 0.25$ 

25%

 (0.25, 0.75)

100%

FPR

 $2 / (2+2) = 0.5$ 

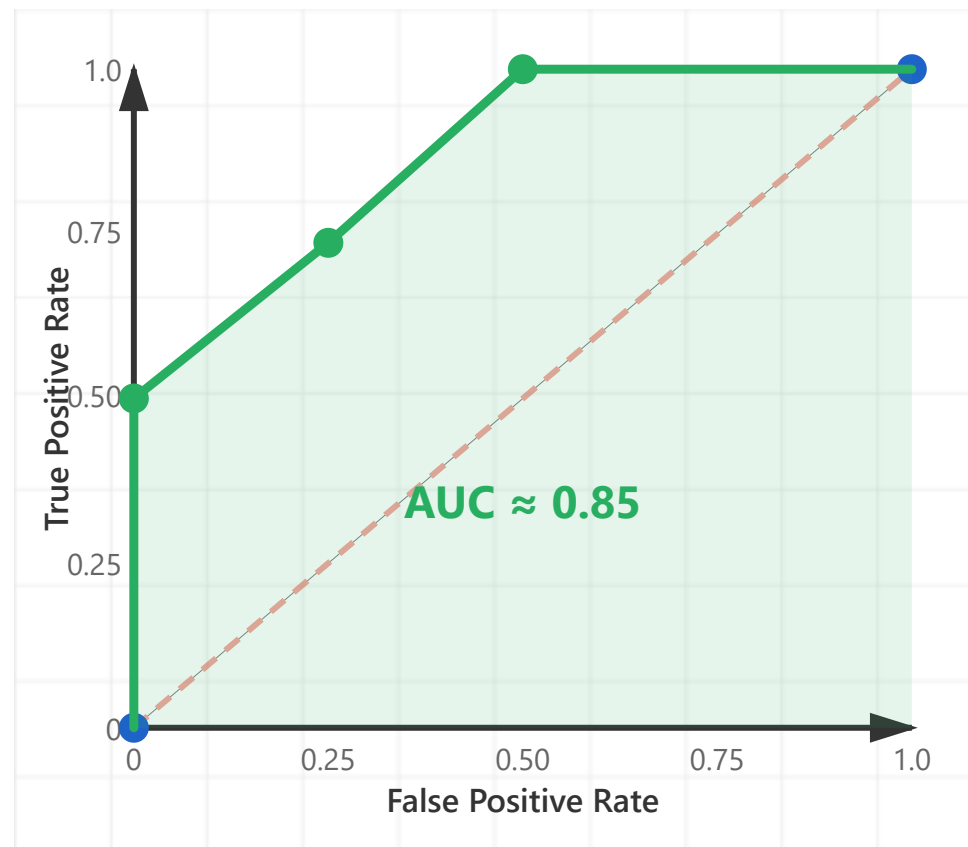
50%

 (0.50, 1.00)

3

## Connect Points to Create ROC Curve

- ◆ Calculate (FPR, TPR) coordinates for all thresholds
- ◆ Sort points by FPR in ascending order
- ◆ Connect points with lines to complete ROC curve
- ◆ Evaluate model performance using AUC



## Key Summary

### Step 1:

Predicted Probability과 Actual Label  
준비

### Step 2:

Calculate TPR and FPR at each  
threshold

### Step 3:

Connect coordinates to create curve

### Result:

Higher AUC indicates better model