

Evaluation Metrics



DARDEN SCHOOL *of* BUSINESS
McINTIRE SCHOOL *of* COMMERCE

TRUE AND FALSE POSITIVES

Observation	Actual Training Label/Class	Predicted Label/Class	Classification Type
1	Yes	Yes	TP
2	No	No	TN
3	Yes	Yes	TP
4	Yes	No	FN
5	Yes	Yes	TP
6	Yes	No	FN
7	No	No	TN
8	No	No	TN
9	No	No	TN
10	No	Yes	FP



THE CONFUSION MATRIX

Predicted Class	Actual Class	
	Class = Yes	Class = No
	Class = Yes	Class = No
Class = Yes	a) TP	b) FP
	c) FN	d) TN



THE CONFUSION MATRIX

Predicted Class	Actual Class	
	Class = Yes	Class = No
	Class = Yes	Class = No
Class = No	3	1
	2	4



CONFUSION MATRIX AND METRICS

Predicted Class	Actual Class	
	Class = Yes	Class = No
	Class = Yes	b) FP
	Class = No	d) TN

$$\text{Accuracy} = \frac{a + d}{a + b + c + d} = \frac{TP + TN}{TP + TN + FP + FN}$$



ACCURACY

Predicted Class	Actual Class	
	Class = Yes	Class = No
Class = Yes	3	1
Class = No	2	4

$$\text{Accuracy} = \frac{3+4}{3+4+2+1} = \frac{7}{10}$$



PRECISION AND RECALL

Predicted Class	Actual Class		Precision	
		Class = Yes		Class = No
	Class = Yes	a) TP		b) FP
	Class = No	c) FN		d) TN
Recall		$\frac{a}{a + c}$	$\frac{d}{b + d}$	



PRECISION AND RECALL

Predicted Class	Actual Class			
		Class = Yes	Class = No	Precision
	Class = Yes	3	1	$\frac{3}{4}$ 75%
	Class = No	2	4	$\frac{4}{6}$ 66.7%
Recall		$\frac{3}{5}$ 60%	$\frac{4}{5}$ 80%	



PRECISION, RECALL, AND COST

A

Predicted Class	Actual Class			
		Class = Yes	Class = No	Precision
	Class = Yes	3	1	75%
	Class = No	2	4	66.7%
	Recall	60%	80%	

\$2,500

B

Predicted Class	Actual Class			
		Class = Yes	Class = No	Precision
	Class = Yes	2	0	100%
	Class = No	3	5	37.5%
	Recall	40%	100%	

\$3,000

Cost of audit is \$500;
Cost of fraud is \$1000



