

CSE 40647/60647 Data Science (Spring 2018)

Lecture 9: Classification: Evaluation

Goals:

- Describe and use validation settings
 - Holdout validation
 - k -fold cross-validation
 - Leave-one-out validation
 - Stratified cross-validation
- Describe and use evaluation metrics
 - Confusion matrix
 - Accuracy, Error rate
 - Sensitivity, Specificity
 - Precision, Recall, F measure, G measure
 - ROC Curve, Area Under the Curve (AUC), Precision-Recall Curve
 - Precision @K, Average precision
 - Mean absolute error (MAE), Root mean squared error (RMSE)
 - Ranking-based measures (Kendall's tau and Spearman's rho)

Given a confusion matrix

Actual\Predicted	C	$\neg C$	
C	1000 (TP)	1800 (FN)	2800
$\neg C$	1200 (FP)	1000 (TN)	2200
	2200	2800	5000

(1) Accuracy =

(2) Error rate =

Given a confusion matrix

Actual\Predicted	C	$\neg C$	
C	1000 (TP)	1800 (FN)	2800
$\neg C$	1200 (FP)	96000 (TN)	97200
	2200	97800	100000

(1) Accuracy =

(2) Error rate =

(3) Sensitivity =

(4) Specificity =

(5) Precision =

(6) Recall =

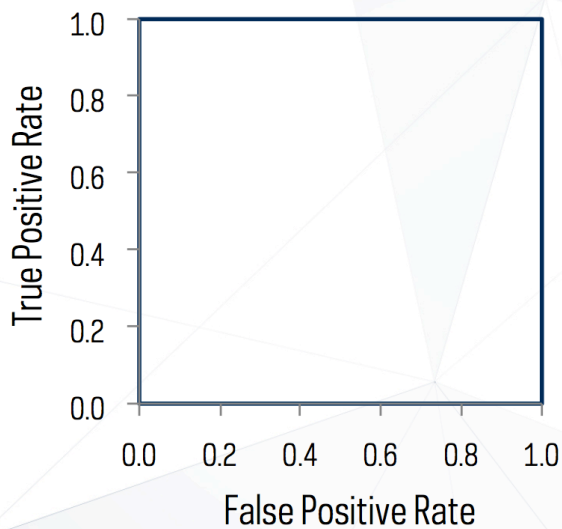
(7) F1 =

(8) F2 =

(9) F0.5 =

(10) G =

ROC Curve



Instance	Class	Score	Instance	Class	Score
1	positive	.9	11	positive	.4
2	positive	.8	12	negative	.39
3	negative	.7	13	positive	.38
4	positive	.6	14	negative	.37
5	positive	.55	15	negative	.36
6	positive	.54	16	negative	.35
7	negative	.53	17	positive	.34
8	negative	.52	18	negative	.33
9	positive	.51	19	positive	.30
10	negative	.505	20	negative	.1

K	P@K	K	P@K
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

(1) Average Precision =

(2) Mean Absolute Error =

(3) Root Mean Squared Error =