Assignment 5

Do not submit (this assignment is not graded).

Problem 1 (10 points) Consider the following confusion matrix.

	predicted class		
actual class		C1 (positive)	C2 (negative)
	C1 (positive)	83	21
	C2 (negative)	58	112

Compute *sensitivity*, *specificity*, *precision*, *accuracy*, *F-meassure*, *F*2, MCC, Kappa statistic measures. You have to show all your calculations.

Answer:

sensitivity = 0.798
specificity = 0.659
precision = 0.589
accuracy = 0.711
F-measure = 0.678
F2 = 0.745
MCC = 0.443
Kappa = 0.427

Problem 2 (10 points) Suppose you built two classifier models *M*1 and *M*2 from the same training dataset and tested them on the same test dataset using 10-fold cross-validation. The error rates obtained over 10 iterations (in each iteration the same training and test partitions were used for both *M*1 and *M*2) are given in the table below. Determine whether there is a significant difference between the two models using the t-test that we discussed in the class. Use a significance level of 1%. If there is a significant difference, which one is better?

Iteration	M1	M2
1	0.08	0.13
2	0.12	0.1
3	0.10	0.12
4	0.11	0.12
5	0.10	0.15
6	0.16	0.13
7	0.17	0.09
8	0.12	0.21
9	0.11	0.22
10	0.21	0.17

Answer:

test statistic = -0.843
t(0.005, 9) = 3.25
Since |-0.843| < 3.25, we cannot reject the null hypothesis. There is no significant difference in performance between the two models.

Problem 3 (10 points). The following table shows a test result of a classifier on a dataset.

Tuple_id	Actual Class	Probability
1	P	0.93
2	N	0.87
3	N	0.42
4	P	0.95
5	P	0.75
6	P	0.83
7	N	0.82
8	P	0.89
9	N	0.63
10	P	0.58

(1). For each row, compute *TP*, *FP*, *TN*, *FN*, *TPR*, and *FPR*.
(2). Plot the ROC curve for the dataset. You must draw the curve yourself (i.e., don't use Weka, R, or other software to generate the curve).

Answer:

Tuple_id	Actual Class	Probability	TP	FP	TN	FN	TPR	FPR
4	P	0.95	1	0	4	5	0.17	0
1	P	0.93	2	0	4	4	0.33	0
8	P	0.89	3	0	4	3	0.5	0
2	N	0.87	3	1	3	3	0.5	0.25
6	P	0.83	4	1	3	2	0.67	0.25
7	N	0.82	4	2	2	2	0.67	0.5
5	P	0.75	5	2	2	1	0.83	0.5
9	N	0.63	5	3	1	1	0.83	0.75
10	P	0.58	6	3	1	0	1	0.75
3	N	0.42	6	4	0	0	1	1

ROC curve: omitted.