

Assignment 5

Due: 3/6

Note: Show all your work.

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

| actual class | predicted class | | |
|--------------|-----------------|-----|-----|
| | | C1 | C2 |
| | C1 | 628 | 137 |
| | C2 | 59 | 394 |

Note: C1 is positive and C2 is negative.

Compute *sensitivity*, *specificity*, *precision*, *accuracy*, *F-measure*, and *F₂*.

Problem 2 (10 points) Suppose you built two classifier models $M1$ and $M2$ 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 $M1$ and $M2$) are given in the table below. Determine whether there is a significant difference between the two models using the statistical method discussed in Section 6 of the online lecture Module 4 (also in Section 8.5.5, pp 372-373 of the textbook). Use a significance level of 1%. If there is a significant difference, which one is better?

| Iteration | M1 | M2 |
|-----------|------|------|
| 1 | 0.21 | 0.13 |
| 2 | 0.12 | 0.1 |
| 3 | 0.09 | 0.20 |
| 4 | 0.15 | 0.2 |
| 5 | 0.03 | 0.15 |
| 6 | 0.07 | 0.05 |
| 7 | 0.13 | 0.14 |
| 8 | 0.14 | 0.21 |
| 9 | 0.05 | 0.23 |
| 10 | 0.14 | 0.17 |

Note: When you calculate $var(M1 - M2)$, calculate a sample variance (not a population variance).

Problem 3 (20 points). For this problem, you are required to run, on Weka, Naïve Bayes, J48, SimpleLogistic, RandomForest, neural network (Multilayer Perceptron), and OneR classification algorithms on *german-bank.arff* dataset and compare the performance of the models built by these six algorithms. Make sure that you select “Cross-validation” for “Test options.” If you have to choose one model, which one

would you choose and why? Note that the neural network algorithm will take a longer time than other algorithms.