

In class Assignment 2

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Instructions: To receive partial/full credit for any problem, a complete answer must be provided, including any procedures needed, using only the methods covered in the lectures. Guesses receive no credit.

Problem 1

The tables below are representations of confusion matrices. Each matrix structure represents the same thing but with different ordering of the rows and columns. Please complete the confusion matrix with the following entries: True Negatives (TN), True Positives (TP), False Negatives (FN), False Positives (FP).

		True default status	
		No	Yes
Predicted default status	No	TN	FN
	Yes	FP	TP

		True default status	
		Yes	No
Predicted default status	Yes	TP	FP
	No	FN	TN

		Predicted default status	
		No	Yes
True default status	No	TN	FP
	Yes	FN	TP

		Predicted default status	
		Yes	No
True default status	Yes	TP	FN
	No	FP	TN

Problem 2

A credit card company developed a classifier for predicting whether or not an individual will default on the basis of credit card balance and student status. We evaluate the classifier on 10,000 test observations. Here is the confusion matrix:

		True default status	
		No	Yes
Predicted default status	No	9,644	252
	Yes	23	81

(a) [5 points] Compute the accuracy of the classifier.

$$\begin{aligned}
 \text{Accuracy} &= (TP + TN) / (TP + TN + FP + FN) \\
 &= (81 + 9644) / (81 + 9644 + 23 + 252) \\
 &= 0.9725 \\
 &= 97.25\%
 \end{aligned}$$

(b) [5 points] Compute the F_1 score.

$$\text{Precision} = (TP) / (TP + FP) = (81) / (81 + 23) \sim 0.779$$

$$\text{Recall} = (TP) / (TP + FN) = (81) / (81 + 252) \sim 0.243$$

$$\begin{aligned}
 F1 &= 2 * (P * R) / (P + R) \\
 &= 0.370 \\
 &= 37\%
 \end{aligned}$$

(c) [5 points] Which of the metrics in parts (a) and (b) is more appropriate for this classifier and why?

The $F1$ score in this case is more appropriate than Accuracy. This is because, the nature of the dataset is highly unbalanced with very low cases being defaults. In this type of scenarios, Accuracy is very misleading. Therefore the $F1$ score, being the harmonic mean of P and R, provides us a much balanced measurement of the classifiers performance.