Area Under Curve rename

Area Under the receiver operator Curve (AUC)

AUC is a commonly used evaluation method for binary choice problems, which involve classifying an instance as either positive or negative. Its main advantages over other evaluation methods, such as the simpler misclassification error, are:

1. It's insensitive to unbalanced datasets (datasets that have more installeds than not-installeds or vice versa).
2. For other evaluation methods, a user has to choose a cut-off point above which the target variable is part of the positive class (e.g. a logistic regression model returns any real number between 0 and 1 - the modeler might decide that predictions greater than 0.5 mean a positive class prediction while a prediction of less than 0.5 mean a negative class prediction). AUC evaluates entries at all cut-off points, giving better insight into how well the classifier is able to separate the two classes.

Understanding AUC

To understand the calculation of AUC, a few basic concepts must be introduced. For a binary choice prediction, there are four possible outcomes:

*   true positive - a positive instance that is correctly classified as positive;
*   false positive - a negative instance that is incorrectly classified as positive;
*   true negative - a negative instance that is correctly classified as negative;
*   false negative - a positive instance that is incorrectly classified as negative);

The true positive rate, or **recall**, is calculated as the number of true positives divided by the total number of positives. When identifying aircraft from radar signals, it is proportion that are correctly identified.

The false positive rate is calculated as the number of false positives divided by the total number of negatives. When identifying aircraft from radar signals, it is the rate of false alarms.

If somebody makes random guesses, the ROC curve will be a diagonal line stretching from (0,0) to (1,1) - see the blue line in the figure below. To understand this consider: Somebody who randomly guesses that 10 per cent of all radar signals point to planes. The false positive rate and the false alarm rate will be 10 per cent. Somebody who randomly guesses that 90 per cent of all radar signals point to planes. The false positive rate and the false alarm rate will be 90 per cent. Meanwhile a perfect model will achieve a true positive rate of 1 and a false positive rate of 0.
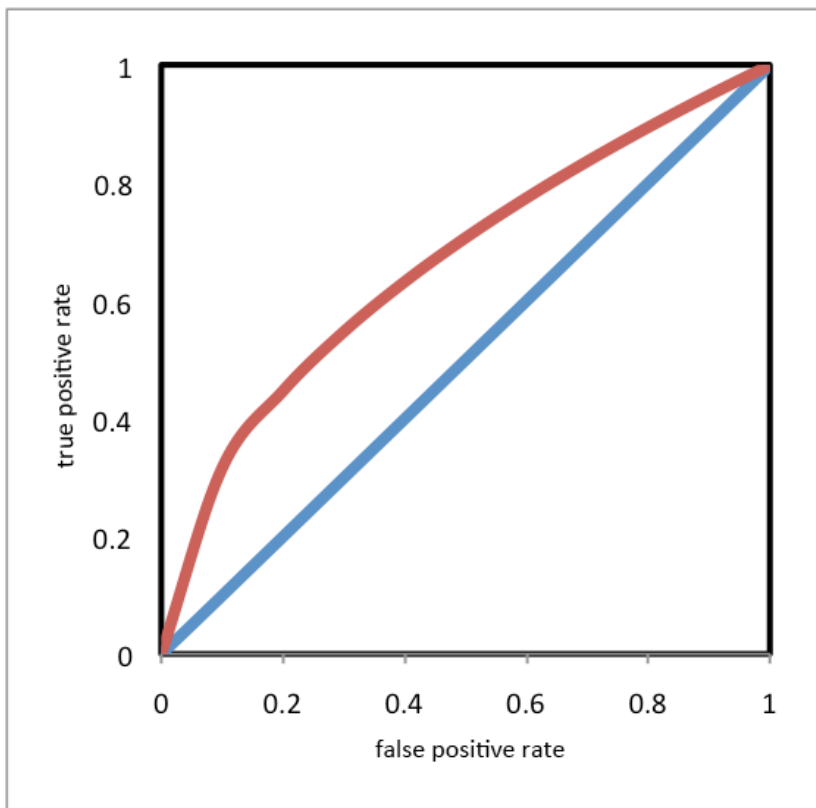
While ROC is a two-dimensional representation of a model's performance, the AUC distils this information into a single scalar. As the name implies, it is calculated as the area under the ROC curve. A perfect model will score an AUC of 1, while random guessing will score an AUC of around of 0.5. In practice, almost all models will fit somewhere in between

AUC Implementations from past competitions

C# code used on Kaggle

Matlab code:

[X,Y,T,AUC] = perfcurve(class,y_pred,posclass);

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