Exercises on evaluation metrics

# **Exercise 1: Binary classifier evaluation for different cut-off score values**

Consider the table below where true classes of eight test examples are presented. In addition, their scores assigned by a predictor are provided. For a final binary classification of the test examples to +1 and -1 classes use this rule: if the score is equal to or greater than a given cut-off score, a classifier predicts +1, otherwise -1.

|  |  |  |
| --- | --- | --- |
| Sample | true class | score |
| X1 | +1 | 7 |
| X2 | +1 | 4 |
| X3 | -1 | 2 |
| X4 | -1 | 1 |
| X5 | -1 | -1 |
| X6 | +1 | -4 |
| X7 | -1 | 5 |
| X8 | -1 | -6 |

1. Work with the cut-off score values 5, 3, 1, *-*3, *-*6 and for each value compute accuracy, precision, and recall of the classifier.
2. Plot an ROC curve of the classifier developed in the previous exercise.

# **Exercise 2: Confusion matrix for a binary classifier**

# A binary classifier was evaluated using a set of 1,000 test examples in which 50 % of all examples are negative. It was found that the classifier has 60 % sensitivity and 70 % accuracy.

1. Write the confusion matrix.
2. Using the confusion matrix created in the previous question compute the classifier’s precision, F1-measure, and specificity.

# **Exercise 3: Precision and ROC curve**

# To test a binary classifier, a data set consisting of 100 positive and 400 negative examples was used. It turned out that the ROC curve goes through the point TPR = FPR = 0.2. Calculate Precision at this point.

# **Exercise 3: metrics for multi-class classification**

You are working on a multi-class classification problem with three classes: A, B, and C. You have trained a classifier and obtained the following confusion matrix:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted A | Predicted B | Predicted C |
| Class A | 90 | 80 | 2 |
| Class B | 5 | 85 | 10 |
| Class C | 3 | 12 | 95 |

Calculate the following metrics:

* Precision, Recall, and F1 Score for each class (A, B, C)
* Overall Accuracy