Chapter 1

Evaluating Classification Systems

The confusion matrix is a tabular method used in machine learning to evaluate the performance of a classification model. It allows for the visualization of the model's performance and to compute various performance metrics.

1.1 Definition of a Confusion Matrix

A confusion matrix is a specific table layout that presents the performance of a classification model. For a binary classification problem, it is a 2x2 matrix that compares the actual and the predicted classifications.

	Actual Positive	Actual Negative
Predicted Positive	True Positive (TP)	False Positive (FP)
Predicted Negative	False Negative (FN)	True Negative (TN)

1.2 Performance Metrics

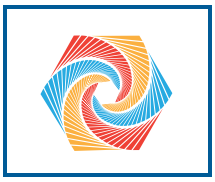
Using the confusion matrix, we can compute several performance metrics:

- **Accuracy:** The proportion of correct predictions (both true positives and true negatives) among the total number of cases examined. It is calculated as $(TP + TN)/(TP + TN + FP + FN)$.
- **Precision:** The proportion of positive identifications that were actually correct. It is calculated as $TP/(TP + FP)$.
- **Recall (Sensitivity):** The proportion of actual positives that were identified correctly. It is calculated as $TP/(TP + FN)$.
- **Specificity:** The proportion of actual negatives that were identified correctly. It is calculated as $TN/(TN + FP)$.
- **F1 Score:** The harmonic mean of precision and recall. It tries to find the balance between precision and recall. $F1 = 2 * (Precision * Recall)/(Precision + Recall)$.

This is a draft chapter from the Kontinua Project. Please see our website (https://kontinua.org/) for more details.

Appendix A

Answers to Exercises



Index

confusion matrix, 1