ATM Fraud Detection via Streaming Data Analytics[[1]](#footnote-1)#

SUPPLEMENTARY MATERIAL

**Fig. S1. Block diagram for ATM fraud detection in static context**

**Algorithm S1:** **Sliding** **Window approach for ATM Fraud detection under the streaming context**

## Evaluation Metrics

We considered AUC to measure the robustness of the employed classifier. In addition to AUC, we considered sensitivity and specificity as the other measures for the binary classification.

### AUC

. It is proved to be a robust measure while handling imbalanced datasets and is an average of specificity and sensitivity. The mathematical representation of AUC is given in Eq. (2).

|  |  |
| --- | --- |
|  | (2) |

### Sensitivity.

It is also well known as True Positive Rate (TPR). It is the ratio of the positive samples that are truly predicted to be positive to all the positive samples. The mathematical notation is given in Eq. (3).

|  |  |
| --- | --- |
|  | (3) |

where TP is a true positive, and FN is a false negative.

### Specificity

. It is also well known as True Negative Rate (TNR). It is the ratio of the negative samples that are truly predicted to be negative to all the negative samples. The mathematical notation is given in Eq. (4).

|  |  |
| --- | --- |
|  | (4) |

where TN is a true negative, and FP is a false positive.

|  |  |
| --- | --- |
| **F:\Misc_projects\5.DST-pro\Streaming\results\outputs\smote_boxplot.png**  **Fig. S2. AUC obtained when SMOTE is employed in the streaming context** | **F:\Misc_projects\5.DST-pro\Streaming\results\outputs\smote_tomek_boxplot.png**  **Fig. S3. AUC obtained when SMOTE-Tomek is employed in the streaming context** |
| **F:\Misc_projects\5.DST-pro\Streaming\results\outputs\smote_tomek_boxplot.png**  **Fig. S4. AUC obtained when SMOTE-ENN is employed in the streaming context** | **adasyn_boxplot**  **Fig. S5. AUC obtained when ADASYN is employed in the streaming context** |
| **vgan_boxplot**  **Fig. S6. AUC obtained when V-GAN is employed in the streaming context** | **wgan_boxplot**  **Fig. S7. AUC obtained when W-GAN is employed in the streaming context** |

1. # An earlier version is submitted to arxiv: <https://arxiv.org/abs/2303.04946> [↑](#footnote-ref-1)