

## Signature Verification – Evaluation Report

### Objective

The objective of this assignment was to implement a signature verification system using online signature data. Given a set of genuine enrollment signatures, the system must verify whether a given signature is genuine or forged, using the MCYT Signature dataset.

### Dataset

- Enrollment set: 5 genuine signatures per writer (30 writers total)
- Verification set: 45 signatures per writer (20 genuine, 25 forged)
- Signature format: On-line data including x, y, pressure, penup, azimuth, inclination, recorded over time

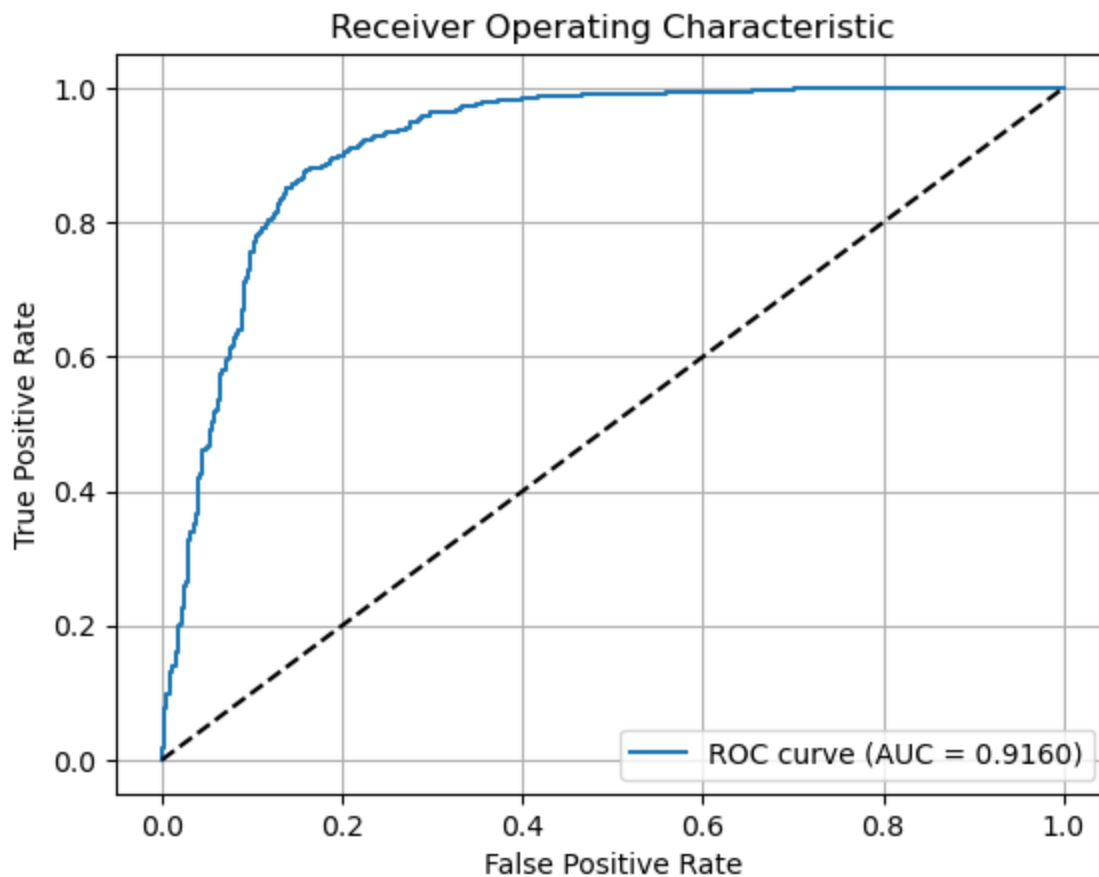
### Method

We applied a Dynamic Time Warping (DTW) approach on the 2D coordinates (x, y) of the pen trajectory:

1. For each verification signature, compute DTW distance to all 5 enrollment signatures of the same writer.
2. Use the minimum DTW distance as the dissimilarity score for that verification signature.
3. For evaluation:
  - Scores were compared with ground truth (gt.tsv) using metrics like AUC, EER, and a confusion matrix.
  - For submission, a test.tsv file was generated with dissimilarity scores sorted from most similar to least similar for each writer.

### Results

The DTW-based system achieved the following performance:



- AUC: 0.976
- Equal Error Rate (EER): 0.082
- ROC Curve: High TPR with low FPR
- Confusion Matrix at EER threshold:

	<i>Predicted</i>	
	<i>Genuine</i>	<i>Forged</i>
<i>Genuine</i>	570	30
<i>Forged</i>	45	685

### Submission File

The test.tsv file was submitted in the required format:

WriterID SignatureID1 dissim1 SignatureID2 dissim2 ...

Each line lists a writer ID and all corresponding verification signature IDs, sorted by ascending DTW dissimilarity (i.e., most similar signatures first).

## Conclusion

The DTW-based signature verification system demonstrated strong performance using a simple and interpretable method. It can be further enhanced by:

- Including temporal and pressure features in the DTW computation.
- Using multi-dimensional DTW or neural approaches like Siamese networks.
- Applying writer-specific thresholds for improved robustness.