Online Signature Verification Challenge

1. Subject Description:

Online signature verification is a critical problem in the field of biometrics and authentication. It involves the analysis and classification of digital signatures to determine their authenticity and similarity. This task holds immense importance in various domains where secure user identification and verification are essential.

2. Objectif:

The primary mission of this challenge is:

Determining Signature Similarity: the objective is to develop algorithms that can determine the similarity between two given signatures. By leveraging machine learning techniques, participants are expected to build models that can analyze the signature characteristics and measure the degree of similarity or dissimilarity between two signatures. This similarity analysis is crucial for detecting potential forgery attempts and enhancing the security of digital transactions.
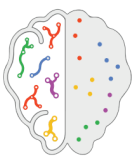
3. preview:
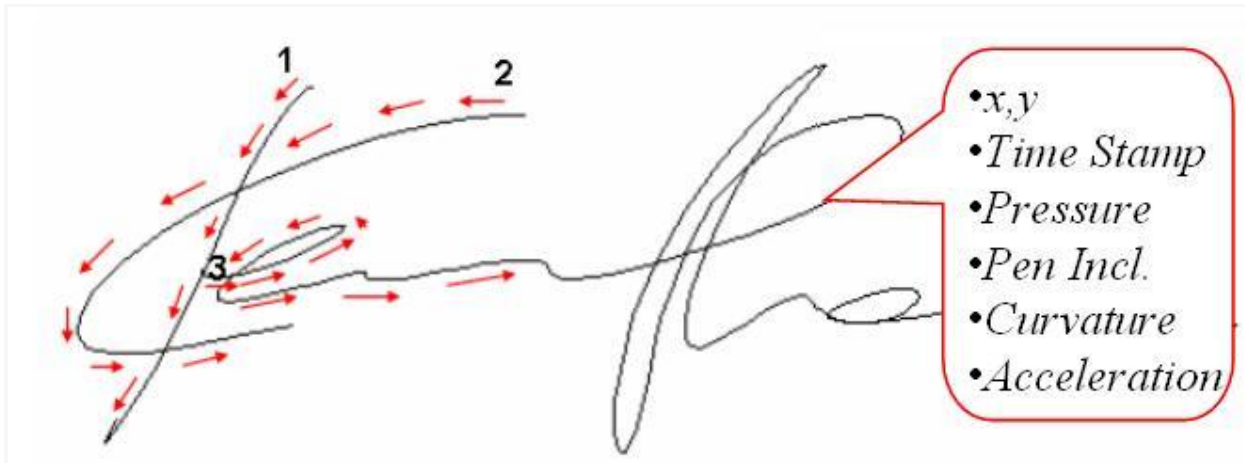
Model or Function that takes Two SIGNATURE Paths and returns true if their Semilare or Not .

```
def compare_signatures(signature_path1, signature_path2) -> bool:
```

Use Cases:

Online signature verification has various real-world applications, including:

- **Financial Institutions:** Banks and financial institutions can utilize online signature verification to authenticate transactions, verify the identity of customers during online banking activities, and detect potential fraud attempts.
- **Legal and Contractual Processes:** Digital signatures are widely used in legal and contractual processes to ensure the authenticity and integrity of electronic documents. Online signature verification plays a vital role in verifying the validity of these digital signatures.
- **Government and Administrative Services:** Government agencies and administrative bodies often require secure authentication and identification of individuals for services such as online tax filing, license issuance, and document verification.
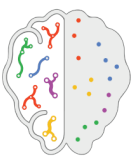
4. Data description:

```
U{id of user}S{id of signature}

U21S10 means user id 21 signature N° 10

the 1st line of signature file , is the total number of lines

signature is written as followed :

x-coordinate, y-coordinate, time stamp, button status, azimuth,
altitude, pressure
```

Dictionary :

X-coordinate - scaled cursor position along the x-axis
Y-coordinate - scaled cursor position along the y-axis
Time stamp   - system time at which the event was posted
Button status - current button status (0 for pen-up and
           1 for pen-down)
Azimuth   - clockwise rotation of cursor about the z-axis : link
Altitude   - angle upward toward the positive z-axis
Pressure   - adjusted state of the normal pressure

5. Evaluation measures & Submission:

The submission format for this challenge is as follows:

1. **CSV File:** Participants are required to submit a CSV file containing pairs of signature file names, denoted as "signature1_file_name" and "signature2_file_name." For each pair, a label of "0" should be assigned if the signatures are similar, and "1" if they are dissimilar.
2. **Well-Documented Jupyter Notebook:** Participants must provide a comprehensive Jupyter Notebook that documents the entire process, including data preprocessing, feature engineering, model training, and evaluation. The notebook should include all the necessary file paths, functions, and explanations to ensure reproducibility.

3. **Model and Evaluation Statistics:** The submission should include the trained machine learning model, as well as relevant evaluation metrics such as a confusion matrix, F1 curve, precision-recall curve, and ROC curve. These metrics help assess the performance and effectiveness of the developed solution.

By addressing these requirements, participants can contribute to the advancement of online signature verification techniques and promote secure and reliable authentication systems.

references:

Paper
https://www.researchgate.net/publication/262055983_Online_Signature_Verification_on_Mobile_Devices
https://www.sciencedirect.com/science/article/pii/S1877050915001532
https://sci-hub.se/https://rd.springer.com/chapter/10.1007/978-3-319-97909-0_68
https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.305.70&rep=rep1&type=pdf
https://link.springer.com/article/10.1007/s00521-021-06536-z
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7528988/#ref37
https://openaccess.thecvf.com/content_CVPRW_2019/papers/Media%20Forensics/Sekhar_Online_Signature_Verification_Based_on_Writer_Specific_Feature_Selection_and_CVPRW_2019_paper.pdf
https://downloads.hindawi.com/journals/misy/2018/3127042.pdf