**Assignment-01**

**Machine learning-based offline signature verification systems.**

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DATASET  
The naming of images is explained here.  
NFI-00602023 is an image of signature of person number 023 done by person 006. This is a forged signature. NFI-02103021 is an image of signature of person number 021 done by person 021. This is a genuine signature.

MODELS USED:

ResNet152 was used as well. Code is in github repository.

PREPROCESSING:

Resnet152 model requires input in terms of 0-1 and same as shufflenetV2.

First bgr to rbg conversion is done and then on the same image dataset , I have applied reshaping technique , since 8 bits are used , I have divided the image width and image height with applying reshaping from 255. For normalization.

Dataset terminologies:

Gentr -> refers to genuine images used for training.

Gent-> refers to genuine images used for testing.

Forgtr-> refers to forged images used for training.

Forgt-> refers to forged images used for testing.

Positive distance refers to genuine images from a threshold distance.

Negative distance refers to forged images from a threshold distance.

Images are converted to particular vectors and then distance is measured , the closest one are matched and the farther one were said to give negative result.

For the purpose of distance , two methods are used , one is based on **linalg.norm(*x*, *ord=None*, *axis=None*, *keepdims=False*)**

Matrix or vector norm.

This function is able to return one of eight different matrix norms, or one of an infinite number of vector norms.

The other one is average to two distance passed to the same function above and the results are shown as below.

RESULTS:

TOTAL NEGATIVE-> 624 IMAGES

TOTAL POSITIVE-> 203 IMAGES

RESNET 152:

forg\_passed is 0

gen\_flagged is 82

forg\_passed is 60

gen\_flagged is 54