أكاديمية سدايا
SDAIA Academy

The fifth project of the Data Science Bootcamp T5

Deep Learning and Convolutional Neural Network (CNN)

Handwritten Signature Forgery Detection

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Do twins have the same handwriting?

NO

Handwriting is often referred to as a brain fingerprint because it differs from one person to another, which is why many organizations use it for the purpose of proof of identity such as:

- Banking.
- Insurance.
- Healthcare.
- Copyright.
- Intellectual Property Rights.
- Regulatory and Government Compliance.

But things like signatures can easily be forged. The rate of forgery is not little, but there are not enough fraud detection experts.

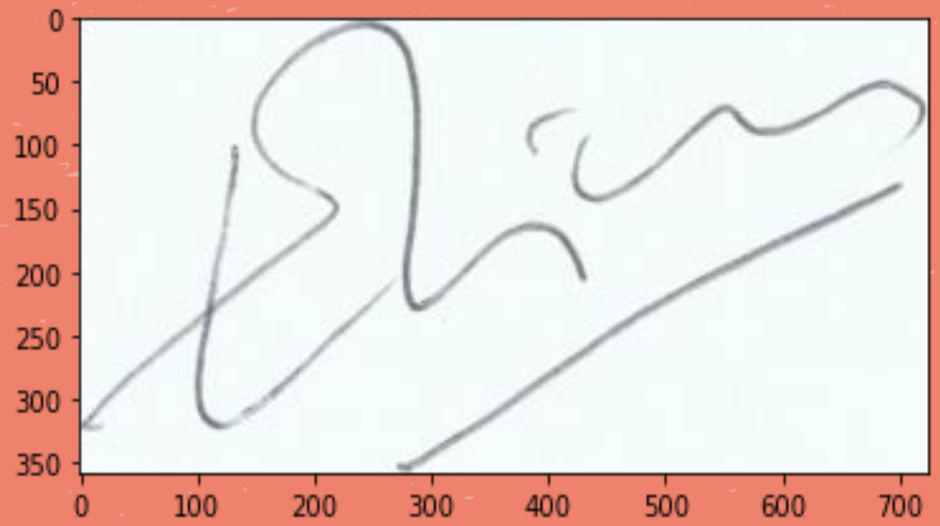
In our project, a solution based on Convolutional Neural Network (CNN) is presented where the model is trained with a dataset of signatures, and predictions are made as to whether a provided signature is genuine or forged.

Data Set

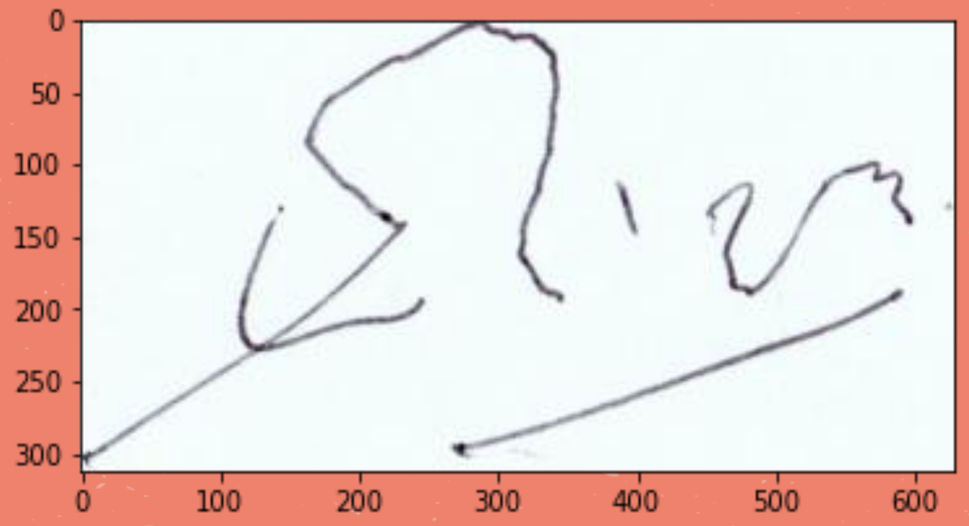
- The Handwritten Signature dataset is found on Kaggle.
- The dataset contains the signature of the user both genuine and forged. In the dataset, the directory number says the name of the user and it's classified into two: Geniune and forged.
- Split the dataset into 1649 for training and 500 for testing.

https://www.kaggle.com/robinreni/signature-verification-dataset

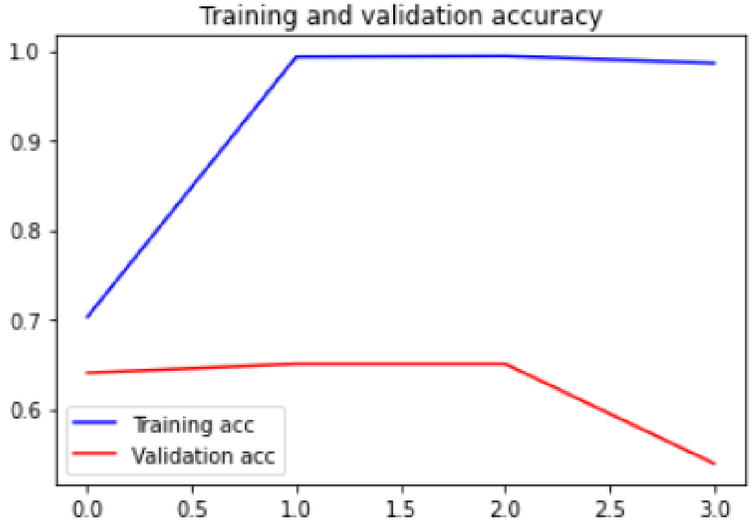
Genuine signature



Forged signature



Root Mean Square Propagation(RMS)

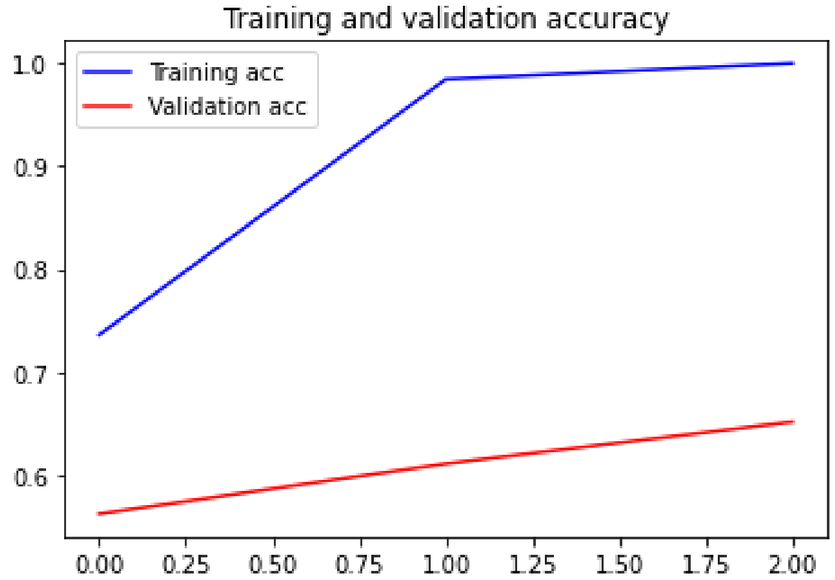


Training Accuracy	Validation Accuracy	Test Accuracy
98%	54%	60%

EPOCHS = 5

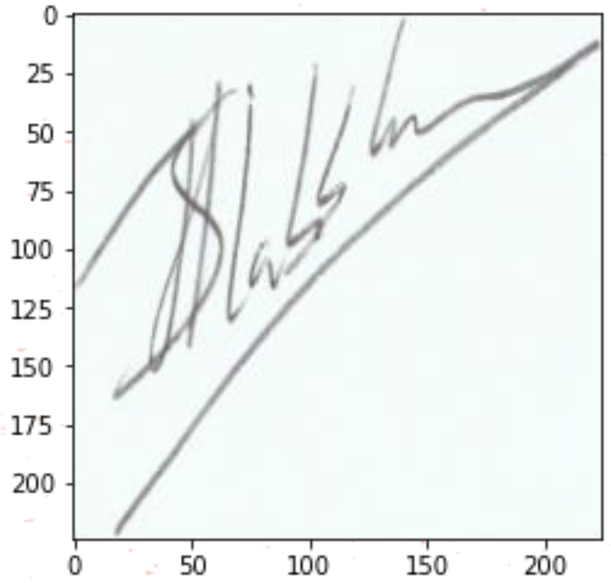
Batch Size = 64

Adaptive Moment Optimizer (ADAM)



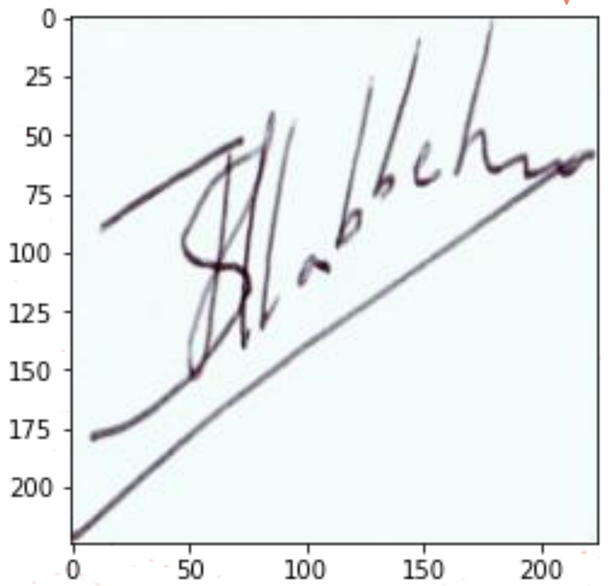
Training Accuracy	Validation Accuracy	Test Accuracy
99%	65.2%	68%

Results of Adam



Probability Genuine: 61%

Probability Forged: 39%



Probability Genuine: 3%

Probability Forged: 97%

Tools

- Libraries:

- Pandas
- NumPy
- Matplotlib
- Seaborn
- Keras (NN library)
- Sklearn
- Tensorflow
- os
- Glob
- Skimage
- gc
- OpenCV-Python(to load the image and change color, the size)

- Technologies:

- Python.
- Jupyter Notebook.

Conclusion

In this project, using Convolutional Neural Network (CNN) has been trained and tested in a dataset and reached an accuracy of 99% and 68% for testing.

Future Work:

- Increase the obtained results by using different DL approaches which are supported by extra feature extraction methods.

Thank you for listening