The fifth project of the Data Science Bootcamp T5

Deep Learning and Convolutional Neural Network (CNN)

Handwritten Signature Forgery Detection

December 2021

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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.

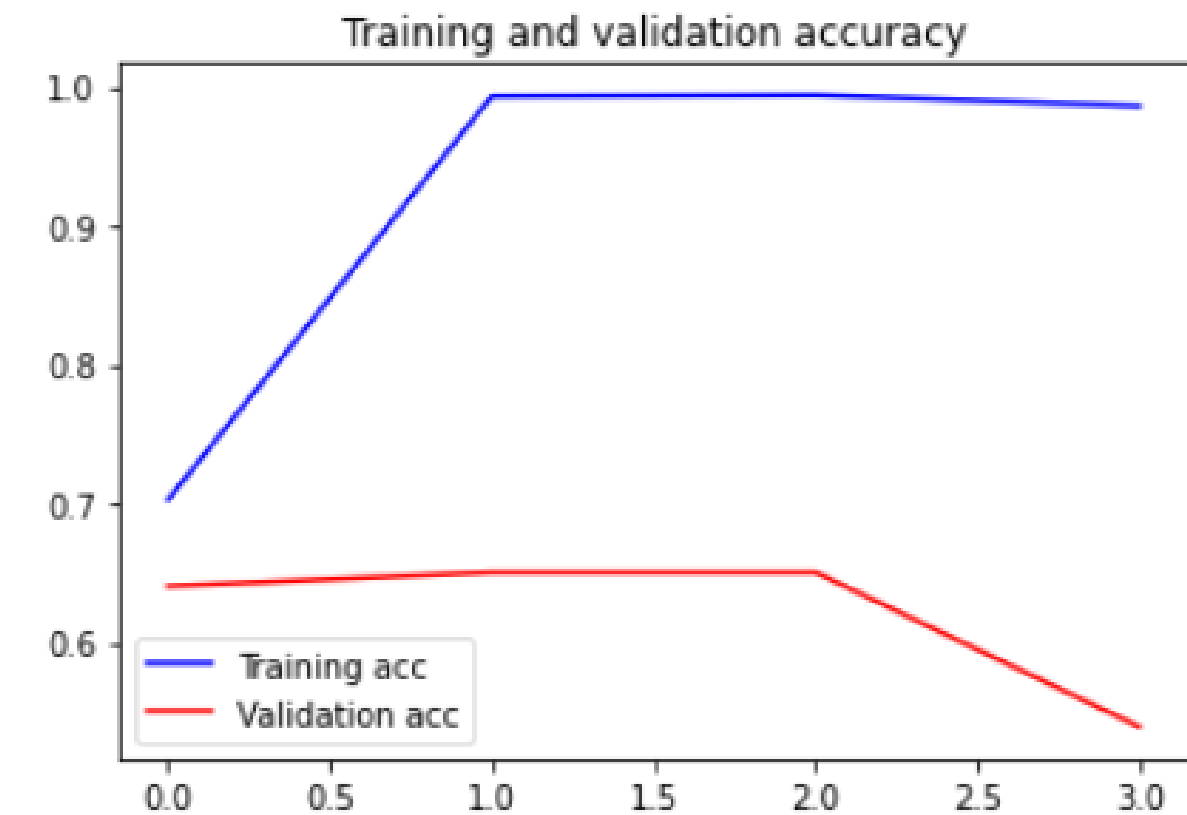- Split the dataset into 1649 for training and 500 for testing.

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

Genuine signature
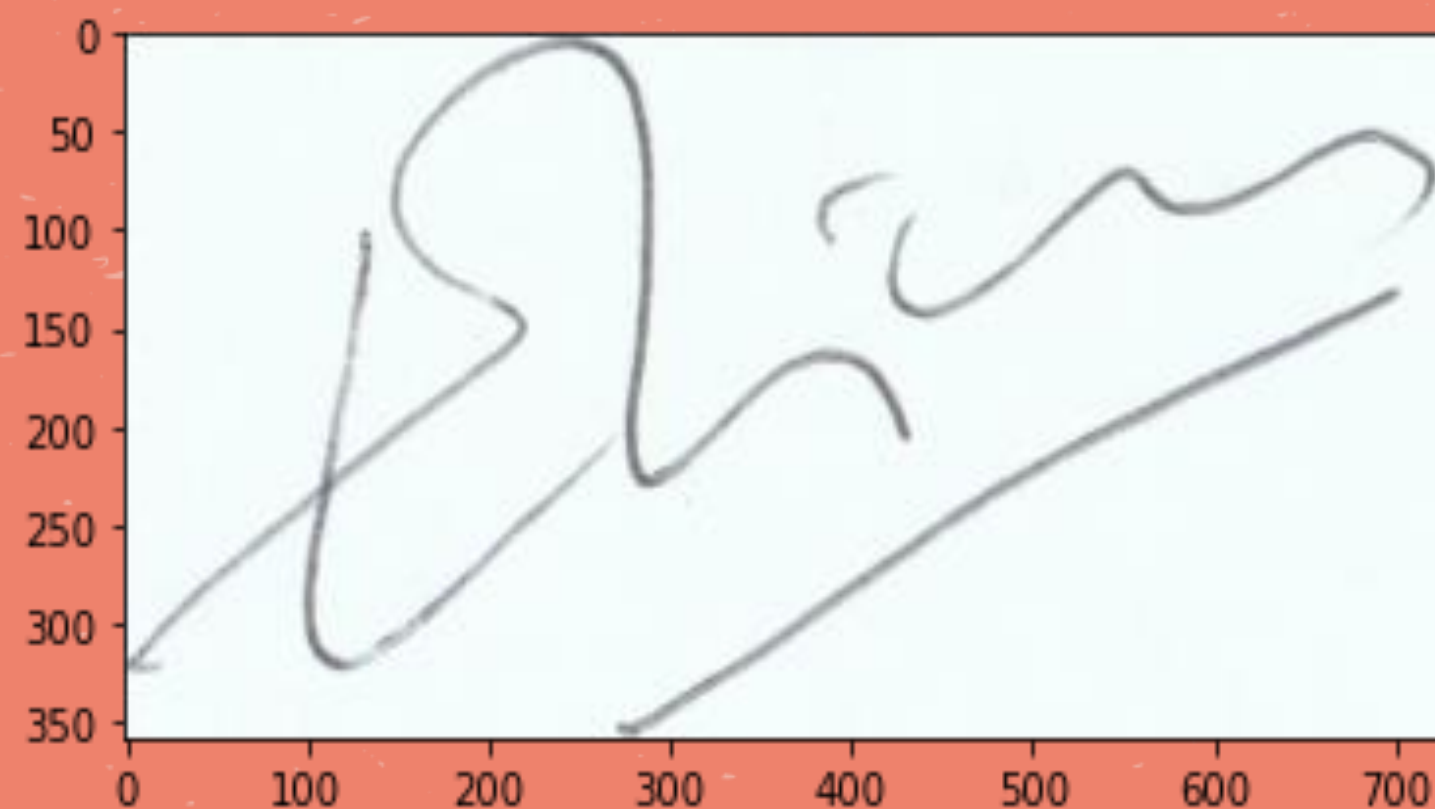
Forged signature
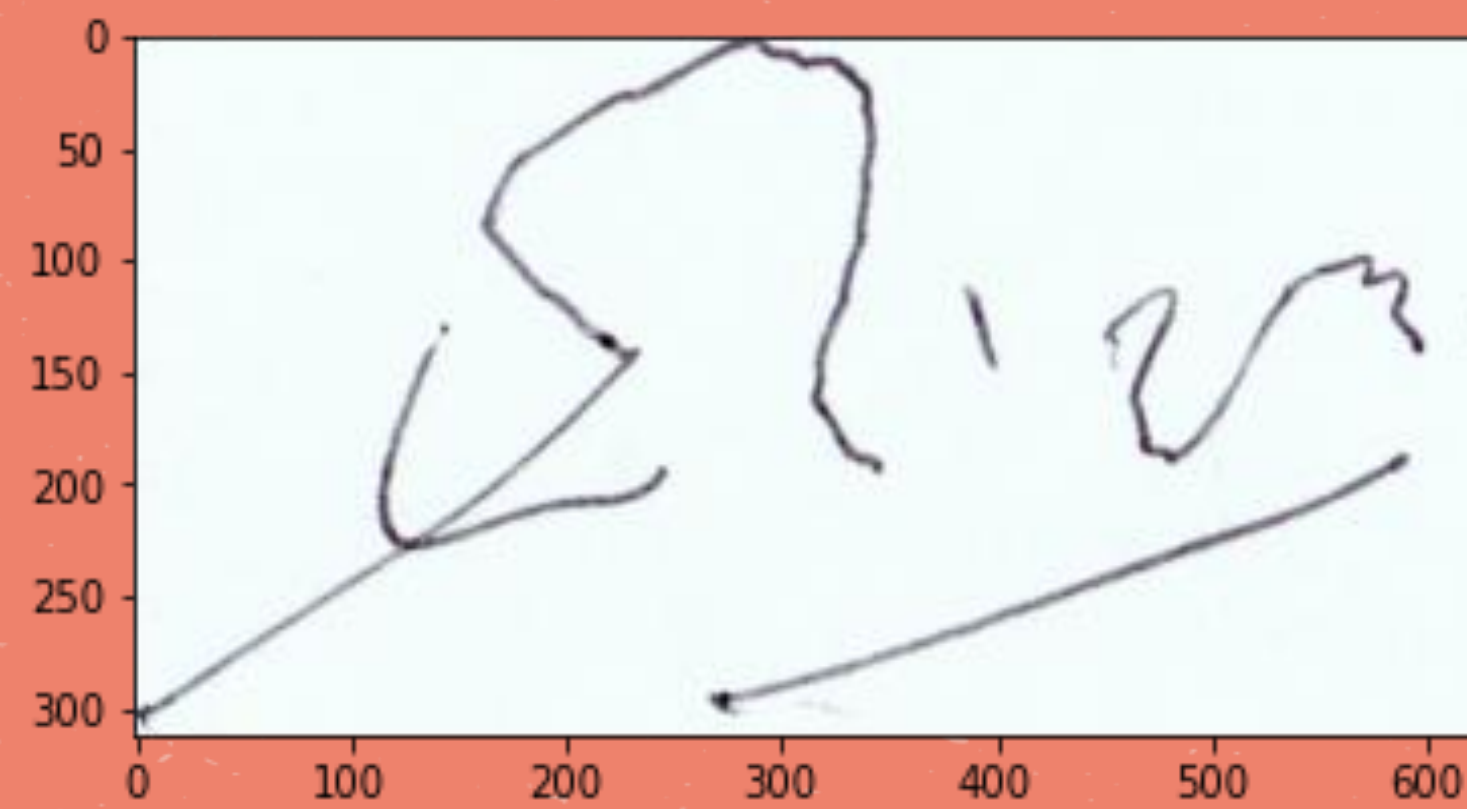
Root Mean Square Propagation(RMS)

Training and validation accuracy

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

EPOCHS = 5

Batch Size = 64

Adaptive Moment Optimizer (ADAM)

Training and validation accuracy
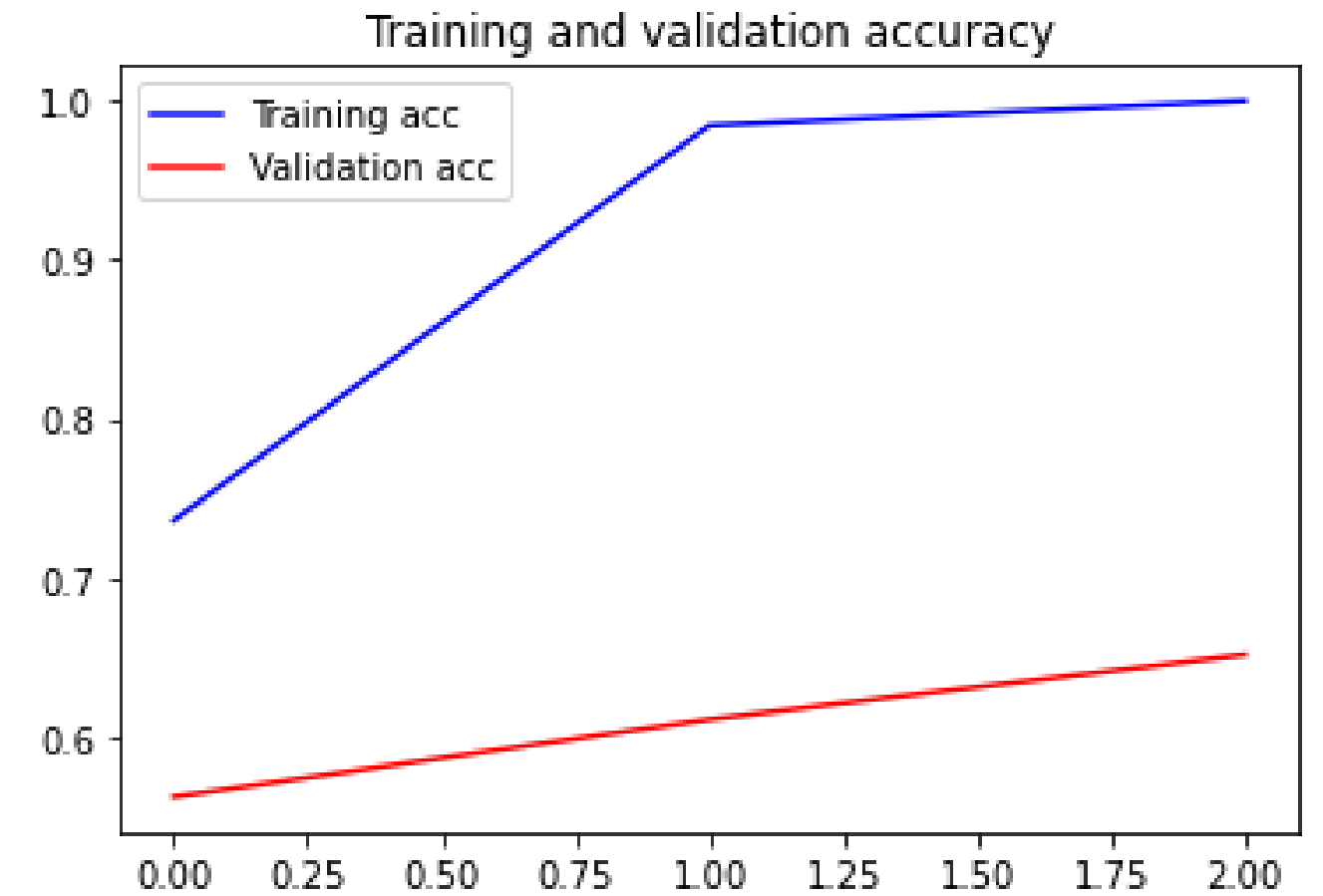
Training Accuracy	Validation Accuracy	Test Accuracy
99%	65.2%	68%

Results of Adam
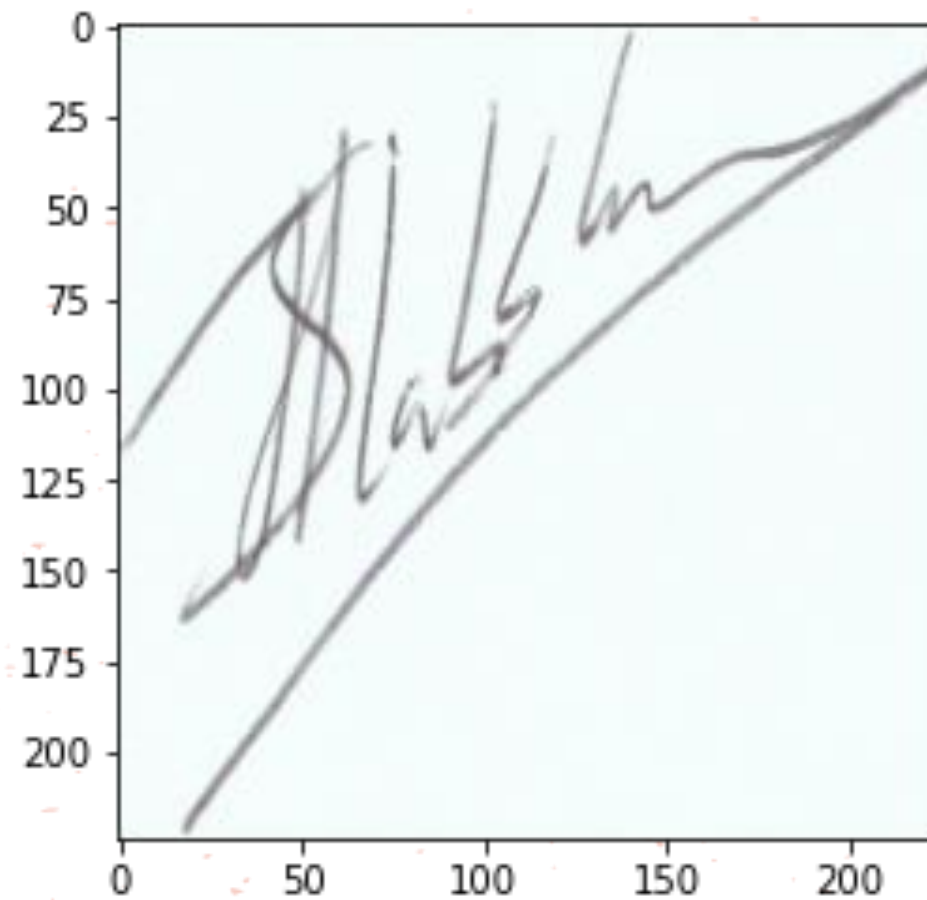
Probability Genuine: **61%**

Probability Forged: **39%**
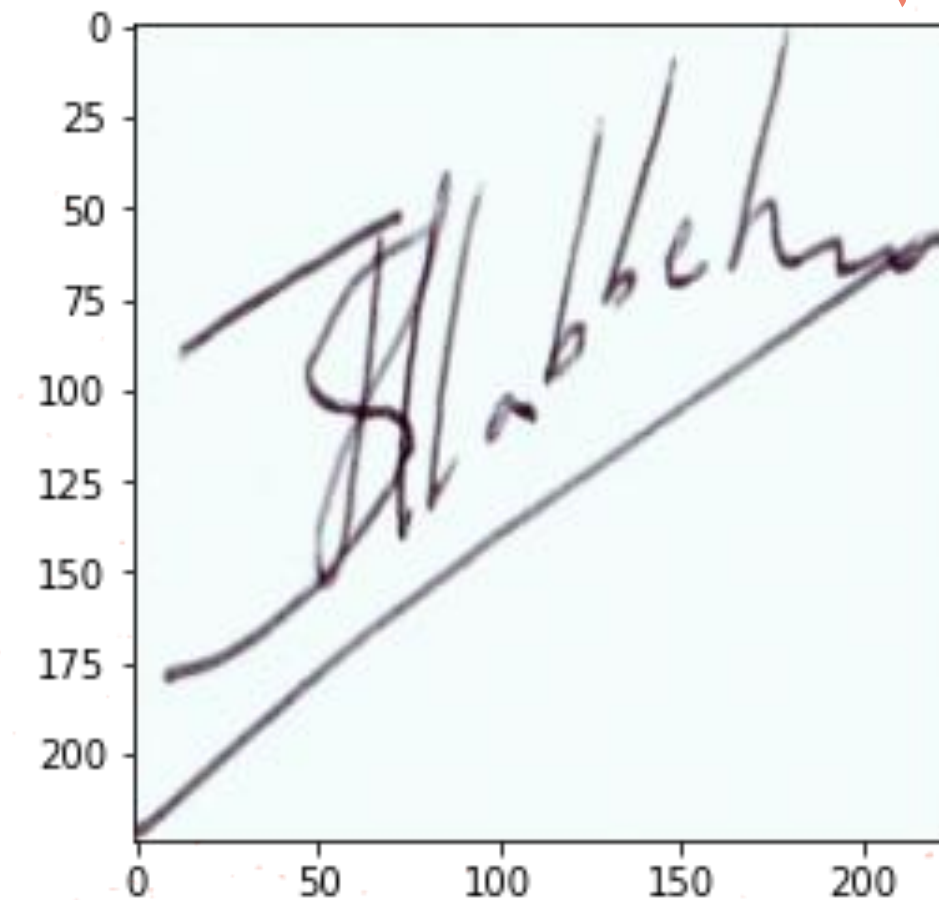
Probability Genuine: **3%**

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

2020
GROSS INCOME

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88%

the action or activity of gathering information about consumers' needs and preferences.

PERFORMANCE, STATISTICS PEOPLE