

Handwritten Signature Verification with the help of Artificial Intelligence

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Degree Project Summary for a Popular Science Readership

With the help of Artificial Intelligence a computer program was able to predict whether or not two signatures were a match or not. The computer correctly predicted 97% of the testing examples.



One genuine handwritten signature.

A handwritten signature is something very unique to an individual. It can be considered as a part of yourself and is called a biometric parameter. In the case of a handwritten signature it is also known to be dependent on how the individual was taught how to write. So it is called a behavioural biometric parameter.

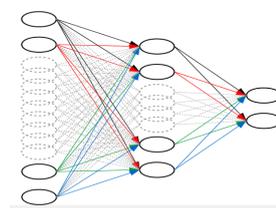
Since the signature is unique to the individual. Is it possible to distinguish between two different peoples signatures? Furthermore is it possible to verify that a person has written a signature and compare it to a previously written signature? The purpose of this project has been to explore the possibility to connect a person to his/hers signature and more specifically to determine whether or not two genuine signature were written by the same person or not. This main problem was solved with the help of artificial intelligence and a technique called deep learning. The results were astonishing with an error rate of around 3% with the developed computer program.

Now what can we do with this computer program? Imagine a future where we could sign all important documents with our handwritten signature and it could electronically be verified instantly. This could be one step towards preventing forgeries and economical loss for individuals. Although there is still a long way to go before reaching this future.



An artistic illustration of a biological neural network.

Trying to jump to the future right away is always hard. So in the development of the computer program several different approaches were tried. The final model used an artificial neural network called max-pooling convolutional neural network which mimics the human brain. The network consists of different mathematical functions which extracts important parts of the signature and makes a prediction.



Schematic picture of a small artificial neural network.

What makes the computer program do a prediction is because of how it can process the signature. The signature consists of many different points in a coordinate system. When looking at a signature there are many hidden variables that are connected to every single point. These variables are the pressure of the pen towards the paper and the angles of how the pen is oriented with the paper. With the help of these different parameters, and the knowledge of whether two signatures matched or not, the computer program could be trained.

The trained final model with an error rate of around 3% is definitely worth continuing investigating in the future to solve the signature verification problem.