International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 03 | March - 2023 Impact Factor: 7.185 ISSN: 2582-3930

Handwritten Signature Verification using Deep Learning

Prof. M.V.Korade
(Project Guide)
Sandip Institute of Engineering and Management
Savitribai Phule Pune University
Nashik, Maharashtra, India

Neha Porje
Sandip Institute of Engineering and Management
Savitribai Phule Pune University
Nashik, Maharashtra, India

Rasika Borade
Sandip Institute of Engineering and Management
Savitribai Phule Pune University
Nashik, Maharashtra, India

Siddhika Mahajan
Sandip Institute of Engineering and Management
Savitribai Phule Pune University
Nashik, Maharashtra, India

Janhvi Patil
Sandip Institute of Engineering and Management
Savitribai Phule Pune University
Nashik, Maharashtra, India

ABSTRACT

Even though most areas, including land records, agreements between parties, legal certificates, identification cards, etc., are moving toward digital documents with digital signatures for authentication, uses only a signature written by hand. Verifying signatures is crucial because a false signature would have a significant impact on the actual owner. Therefore, it is essential to recognize genuine signatures in order to avoid such frauds. In this work, the deep learning technique is used to recognize the signature because it produces the highest accuracy and does not require excessive preprocessing. Image processing, classification, and segmentation are the most common applications for a deep learning model that is based on a convolutional neural network (CNN). The CNN algorithm learns more than KNN, SVM, and other algorithms. This work makes use of CNN to improve classification.

Keywords*: *Signature, Convolutional Neural Networks (CNN), Support Vector Machine (SVM), K-Nearest Neighbors (KNN).

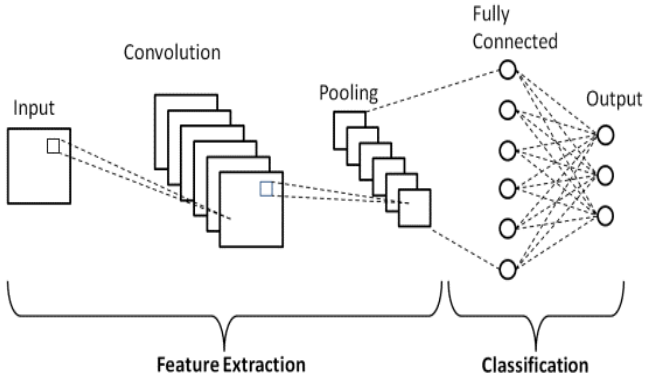
1.INTRODUCTION

Humans came up with the brilliant method of training a computer to behave like a human brain, which led to the development of machine learning. One of their advantages is their capacity to construct an inside portrayal of a two-dimensional image. When working with images, this enables the model to acquire position and scale invariant data. A type of machine learning called deep learning is based on how people learn certain kinds of information. It is extremely beneficial for data scientists because it involves predictive modeling and statistics. Both counterfeit neural organizations (ANNs) and mimicked neural organizations (SNNs) are types of deep learning approaches. A type of deep, feed-forward artificial neural network known as a CNN is used to break down AI's visual aids. This project aims to classify the genuine signatures of ten users using a typical CNN. One of the huge scope issues (LSVRC) is the Large Scale Visual Recognition Challenge. Innovation based on (CNNs) is being gained from the beginning.

For the purpose of identifying the author during this investigation, we have utilized forensic methods such as angle, categorical attributes, scalar measures, alignment to the baseline, length of strokes, slant of strokes, shape, punctuation, order, text loops, character spacing, and so on. These factors help in the analysis of the signature's verification, particularly in locating the author together. An enormous dataset is required for both testing and experimentation in order to conduct signature analysis. As a result, the signature datasets are taken for further examination.

Convolutional Neural Network (CNN)

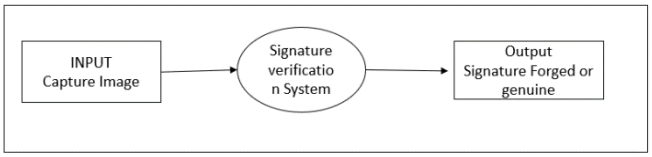
A type of deep learning neural network used to recognize visual information are convolutional neural networks (CNNs). Convolution neural networks, also known as space invariant artificial neural networks (SIANN) or shift invariant, have layers like the convolution layer, pooling layer, flattening layer, dropout layer, and dense layer. Deep learning algorithms include the Artificial Neural Network (ANN) and the Recurrent Neural Network (RNN).



A) Problem Framework

With the help of the SVM algorithm and image processing, create a system that can identify authors based on their signatures to 90% accuracy, and for real-time deployment, use the SVM and CNN machine learning algorithms to effectively recognize signatures.

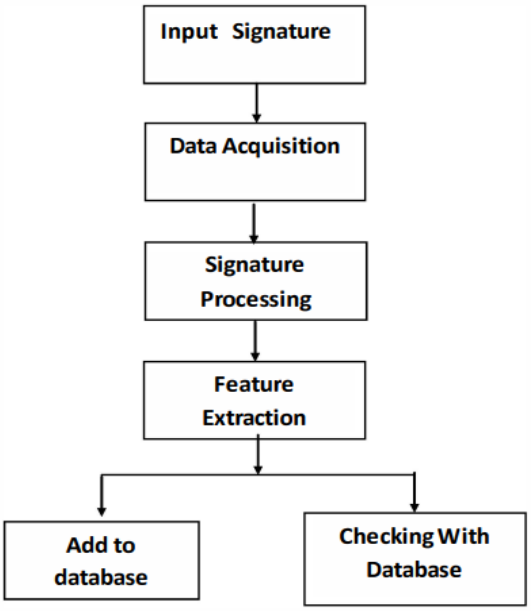
B) Model framework



Verification of the signature on a document is necessary to ensure its authenticity.

The above chart shows the progression of model. First, the document's signature is taken with a camera, and this image is fed into the model for preprocessing. The CNN algorithm is used to extract the image's features, which are then checked by comparing them to the system's original database.

C) Architecture diagram



This diagram shows how the software will be used to check authenticity of signature. The captured image of signature will be fed into the model then the further processing will be done. The extracted features will be compared with the database if matched then the signature is original if not then forged.

2.LITERATURE REVIEW

Mohit kumar A. Joshi, Mukesh M. Goswami, Hardik H. Adesara (2015).[1] Emotion control is one of personality characteristics that can be de tested through handwriting or graphology. One of the advantages is it may help the counselor that has difficulties in identifying the emotion of their counsel. This study is to explore the fuzzy technique for feature extraction in handwriting and then identify the emotion of person. This study uses baseline or slope of the handwriting in determining the level of emotion control whether it is very low, low, medium, high or very high, through Mamdani inference. Here, they have proposed to identify the emotional control of particular person based on their handwriting. The preprocessing technique is applied to detect the baseline and the adaptation of fuzzy inference methodology.

N.aqili,1a.maazouzi,1m.raji,1a.jilbab,1s.chaouki,1 a.hammouch 1 lrge laboratory, enset, mohammed v University in Rabat, [2] It has long been recognized that the authentication of individuals is an essential component of society. Security necessities have really focused on biometrics. Confirmation of the mark is one of the biometric techniques utilized in acknowledgment frameworks. A novel approach to verifying an individual's online signature is presented in this paper. Local parameters are extracted as time functions with various dynamic properties during the features extraction step. The Discrete to Continuous Algorithm is applied to features during the recognition phase to validate a person's claimed signature. The proposed algorithm yields results with a high rate of accuracy. Pattern recognition and biometrics are considered to be subfields of automatic signature, fingerprint, voice, and face image recognition. It aims to identify individuals based on their biometric features.

Anastasia Beresneva, Anna Epishkina, Darina Shingalova [3] The main informative parameters of a signature, such as size, shape, velocity, pressure, and so on, are examined in this paper in relation to authentication systems based on handwritten signatures. They dissected their measurable attributes and considered strategies to separate them utilizing wavelet change, discrete Radon and Fourier changes. In order to develop a reliable verification algorithm, methods for collecting data on handwritten signatures were investigated.

Moises Diaz, Part, IEEE, Andreas Fischer, Part, IEEE [4]

The unique mark is a biometric quality broadly utilized and acknowledged for checking an individual's character. In order to accurately verify an individual's identity, automatic signature-based biometric systems currently in use typically require five, ten, or even more specimens of the individual's signature. This paper proposes a training method that uses only a single reference signature to mitigate this disadvantage. A number of duplicates of the given signature are used in our strategy to train an automatic signature verifier with each one. Yu-Shen Lin, D. J. Guan, E. S. Zhuang, I. C. Chung, [5] they compare three approaches for detecting invalid signatures during batch verification. The first method, called the "random select test," selects half of the signatures to be verified in a batch at random. The popular small exponent test is the second approach. The random numbering test, the third method, is a simplified version of the matrix-detection algorithm. The randomly numbering test verifies the signatures in blog batches by randomly selecting the order of the signatures, where k is the number of signatures. They evaluate the efficacy of each method by simulating it. When there are a lot of signatures in a batch verification, the randomly numbering test is better than the small exponent test.

For multiscript signature verification, Keigo Matsuda, Wataru Ohyama, and Tetsushi Wakabayashi [6] propose an improvement to the combined segmentation verification method. Multiple offline and online signature verifiers using various modalities are combined in the

proposed approach through the use of a fusion strategy. They use offline signature shape features that reflect the pen pressure and pen velocity of the signature signers and are extracted from separated three color plane (RGB) images.
Muhammed Mutlu Yapıcı, Adem Tekerek. proposed a Deep Learning (DL)-based offline signature verification method to stop malicious individuals from signing fraudulent documents. The Convolutional Neural Network (CNN) is the DL method utilized in the study. Writer Dependent (WD) and Writer Independent (WI) are two distinct models for which CNN was designed and trained separately. The results of the experiment demonstrated that WD has 75% success and WI 62.5 percent success. If additional feature extraction methods are added to the CNN method, it is anticipated that the success of the obtained results will rise.

3.CONCLUSION

In this research, we provide a handwritten signature verification system that is based on machine learning. It is an incredibly trustworthy way to verify the authenticity of the users.

4. REFERENCE

[1]Mohitkumar A. Joshi, Mukesh M. Goswami, Hardik H. Adesara(2015), “Offline Handwritten Signature Verification Using Low Level Strokes Features”,India, IEEE, 978-4799-8792- 4/15

[2] Kamlesh Kumari, V.K.Shrivastava, (2016), “Factors Affecting The Accuracy of Automatic Signature Verification”, India, IEEE, 978- 3805-4421-2/16

[3]Avani Rateria, Suneeta Agarwal, “Offline Signature Verification through Machine Learning”,(2018), India, IEEE, 978-1- 5386-5002-

[4] Derlin Morocho, Aythami Morales, Julian Fierrez, Ruben VeraRodriguez,”Towards human-assisted signature recognition: improving biometric systems through attribute-based”.

[5] Derlin Morocho, Aythami Morales, Julian Fierrez, Reuben VeraRodriguez, “Human Assisted Signature Recognition based onComparative Attributes” (2017) IEEE, 2379-2140/2140/17 JSPM”.

[6] N Cristianini, and J. Shawe-Taylor, An Introduction to Support Vector Ma- chines and Other Kernel-based Learning Methods, Cambridge University Press, 2000.

[7] D. Hosmer, Applied logistic regression, Hoboken, New Jersey: Wiley, 2013.

[8] D. Beatrice, and H. Thomas, On-line Handwritten Signature Verification using Machine Learning Techniques with a Deep Learning Approach, Master’s Theses in Mathematical Sciences, 2015.

[9] A. Beresneva, A. Epishkina, S. Babkin, A. Kurnev, and V. Lermontov, “Hand- written Signature Verification: the State of The Art,” Advances in Intelligent Systems and Computing, Vol. 636, 2017, pp. 234-238.

[10] G. Dimauro, “Fourier Transform in Numeral Recognition and Signature Veri- fication,” Pattern Recognit., vol. 22, No. 2, pp 823-857, 2011