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Signature Verification and Forgery Recognition System Using Machine Learning

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ABSTRACT: Biometrics is now widely used all over theworld for the identification and verification of peopleand their signatures. A person's handwritten signature is a unique identifying work of human thatis primarily usedand recognized in banking and other financial and legal operations. Handwritten signatures, on the other hand, are becoming increasingly valuable due to their historicalsignificance as a target of deception. The Sign Verification System (SVS) tries to determine whethera sign is genuine (created by the specified individual)or forged (produced by an impostor). Using images of scanned signatures and other documents without dynamic information about the signing process has proven difficult, especially in offline (static) situations. The use of Deep Learning algorithms to learn feature signature picture representations hasbeen well-documented in the literature over the last five to ten years. Here, we examine how the subject has been studied throughout the lastfew decades, as well as the most recent developments and futurestudy plans.

I. INTRODUCTION

The widespread and continuing usage of signatures for which signature verification is categorized. This study concentrates on identifying online signature verification forgeries. In the suggested method, we applied the discrete Fourier transform, which is used to extract information that can be used to distinguish a fake signature from a real one. Next, we classified data using the Gated Recurrent Unit (GRU) and Long Short-Term Memory (LSTM) methods of recurrentneural networks. Because we know both past and future results in this situation, we used bidirectional LSTM and bidirectional GRU.

II. MOTIVATION

Even in the digital age, customers still use their signatures as a primary form of authentication for a range of transactions. Their signatures authorize checks, new account paperwork, loan documents, and more, and to minimize the risk of fraud, your financial institution needs the right solutions to detect forgeries quickly and accurately

III. OBJECTIVE

•To improve accuracy of existing signature verification/recognition methods.
•To reduce the time required for correct identification of original signatures from forged ones.
•Reduce fraudulent activities by recognition of signatures in legal documents and cheques used in personal authentication, signature verification has been a focus of the current study.

IV. EXISTING SYSTEM

Because more informational dimensions are accessible, online signature verification methods typically outperform offline systems in terms of performance. One of the most popular methods in use today to authenticate someone is signature verification. Because of this, attackers frequently attempt signature forging.

The system consists of major steps preprocessing, feature extraction, and classification. In the testing phase verification is done with pertained sample signatures.

•Preprocessing: The motivation behind the pre-processing stage is to make signature standards and prepared for include extraction. The pre-preprocessing stage basically includes noise, resizing, Binarization, thinning, clutter removal, and normalization

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•Feature Extraction: Features extraction is required when input information to an algorithm is excessively huge and repetitive. This excess information is then changed into the brief and fundamental arrangement of features. This technique is called feature extraction. Features compared with offline signatures may incorporate.

•Classification : Classification is the process where input information is sorted. Another piece of information when contributing to the framework tends to be effectively recognized as having a place with a specific class

•Verification : In this step prepared classifier verify the test signature against a set of test sample signature it has pertained to during the classification stage. If the match is found over a certain threshold, then the signature is considered original else it is considered forged.

V. LITERATURE SURVEY

A. Beresneva, A. Epishkina, and D. Shingalova, ”Handwritten signature attributes for its verification,”[1] 2018 - This paper examines authentication systems based on handwritten signature and the main informative parameters of signature such as size, shape, velocity, pressure, etc. The authors analyzed their statistical characteristics and considered methods to extract them using Wavelet transform, discrete Radon, and Fourier transform. To design an effective verification algorithm, handwritten signature data acquisition methods were investigated.
R. D. Rai and J. S. Lather, ”Handwritten Signature Verification using TensorFlow,”[2] 2018 – The proposed system was designed using TensorFlow, which is used widely for deep learning. The Convolutional Neural Network (CNN) used in the designed system is capable of accurately verifying the characters unique to the original signature.

VI. ALGORITHMS

Convolution Neural Networks (CNN): CNNs are a pivotal component of the project’s machine learning and computer vision techniques. CNNs are well-suited for feature extraction and pattern recognition tasks, which are critical for analyzing the unique traits within signatures. They excel at identifying stroke patterns, pressure points, pen angles, and other distinctive features that differentiate one person’s authentic signature from a forgery. By training the CNN on a large dataset of genuine and forged signatures, the system can learn to discern these intricate details with a high level of accuracy, thereby enhancing the reliability of the verification process.. Signature Verification and Forgery Recognition System Using KNN, Backpropagation and CNN. 10. k-Nearest Neighbors (k-NN): The k-NN algorithm is instrumental. for the project in terms of the verification process. Once the CNN extracts. and encodes the unique signature traits, the k-NN algorithm can be employed. to compare these features with reference signatures in the database. The k-NN algorithm categorizes a signature as genuine or a forgery by measuring the similarity between the signature’s encoded characteristics and those of known authentic signatures. The ”k” in k-NN represents the number of nearest neighbros to consider, and it can be adjusted to achieve the desired trade-off between accuracy and computation time. By leveraging k-NN, the system can make real-time determinations about signature authenticity, ensuring a high level of accuracy in the verification process.

VII. SYSTEM ARCHITECTURE

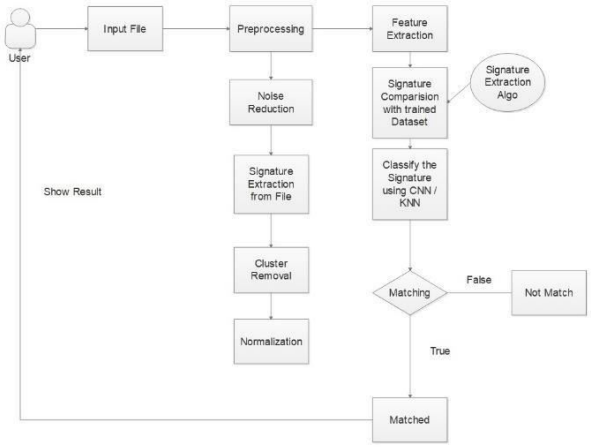

Fig -1: System Architecture Diagram

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Classification: Classification is the process where input information is sorted. Another piece of information when contributing to the framework tends to be effectively recognized as having a place with a specific class

Verification: In this step prepared classifier verify the test signature against a set of test sample signature it has pertained to during the classification stage. If the match is found over a certain threshold, then the signature is considered original else it is considered forged

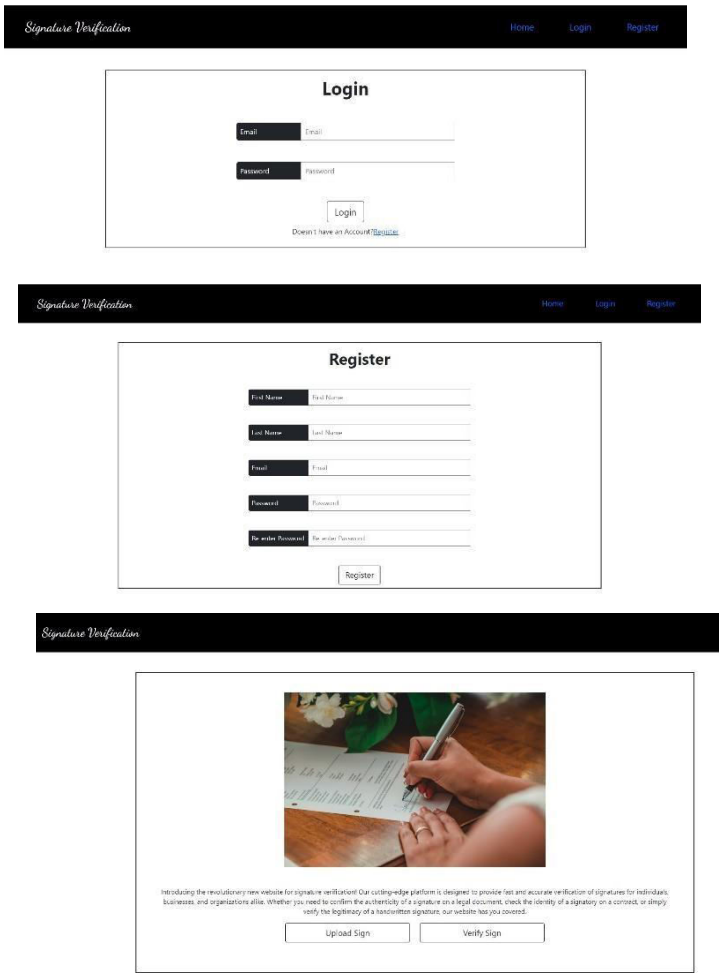
ADVANTAGES

- Easy to used system
- Control system from anywhere
- Centralized system

APPLICATION

- Student sector
- Government Sector

VIII. RESULT



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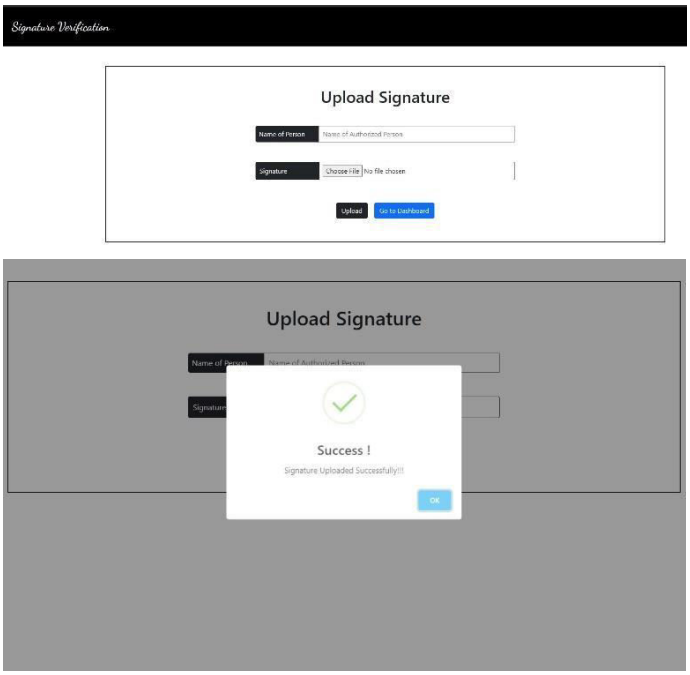

IX. CONCLUSION

A detailed overview of the process of verification of the handwritten signatures system is done enabling the user to do the image processing and classification together in one application. It can be used as an integrated tool for different do-mains such as the internal system of a bank or an inventory and sales management system of a retail shop.

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