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Signature Verification and Forgery Detection

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Abstract:

This paper presents a unique an innovative approach for the signature verification and forgery detection. Mostly it have been as a challenge in the field of biometrics. Now a days as there is increase in the technology it is much easier for the fraudsters to forge the signatures. So, making a verification of signature whether it is unique or forged is much important task to check the authentication. Here in this paper we will discuss about the various methods used in the signature verification and forgery detection. Here we used trained data to check whether the system is working.

1.Introduction:

Signature verification and forgery detection is the process of verifying signatures automatically to determine if the signature is real or forged. There are two categories in verifying signatures: one is static and the other is dynamic. Static is also called as off-line verification. It is the process of checking the electronic signature or paper signature. Dynamic is also known as on-line verification. And takes place as a subject creates a signature in question is then compared to previous samples of signatures , which constitute the knowledge base. When it is the case of ink signature on the paper the system needs the sample to be scanned for analysis whereas a digital signature is already maintained in a data format that signature verification can use.

The design of a signature verification system requires the solution of three sub categories: data acquisition, feature extraction process and performance evaluation. . Signatures have been an important piece of human innovation for truly thousands of years, and in advanced we use them for our authentication .From sign receipts to authenticate documents, sign autographs. The situation is totally different in the case of the identification. The main objective in case of identification is to recognize an individual from the stored data .Generally a signature is a persons name which is signed in a unique way for identifying and authorization in documents, visas, approvals, certificates etc. Any fraud of a signature can result in severe damages in persons lives and assets. For such cases, a systematic approach is used to verify the signature and is very necessary to prevent such forgery .Signatures were handwritten on a white sheet using a pen. The signatures were scanned at a resolution of 200 dpi. There was also some offline signature system consisting of signatures recognition and verification .It is a multistage classifier .As of then the technology was not that updated and computers became affordable people designed the automatic forgery detecting systems. The forgeries are categorized into 3 types.They are:

Random Forgery: It is a simple forgery which is done very randomly by the victim itself and here the victim does it in his own style.

Skilled Forgery: It is done by the professional people who already have the experience in copying the signatures.

Unskilled Forgery: The signer imitates a sign without any professional knowledge in their own style.

2.Literature Survey:

The Signature verification is most popularly used and it is also used now for the authentication purpose. Here in our software there is a software for storing all the signatures. Feature extraction is also done for signature verification here. And there are 5 different geometrical features for the feature extraction: Area, Centroid co ordinates,Eccentricity ,Kurtosis and Skewness are used to classify the signatures. And in the database of signatures every signature is stored and the software is trained with all these signatures. Training is done using Trainlm model .The model performance evaluation tests 100 signatures from 3 users. And for training the data parameters are chosen.Most of the researchers investigated many techniques which helped to improve the handwritten signatures.There is a pre modeling step here in which improves the quality of the image.Here we applied Sobel edge detection techniques for more clarity on the images of signatures.

Proposed System:

This features are trained from the signatures which are present in the database . The model is trained with help of writer independent classifier.And then the model is evaluated from the test set.Here the writer independent features for every user have been trained using Convolutional Neaural Networks. This has been used to classify and explore a forged signature and differ them from unique set of signatures.

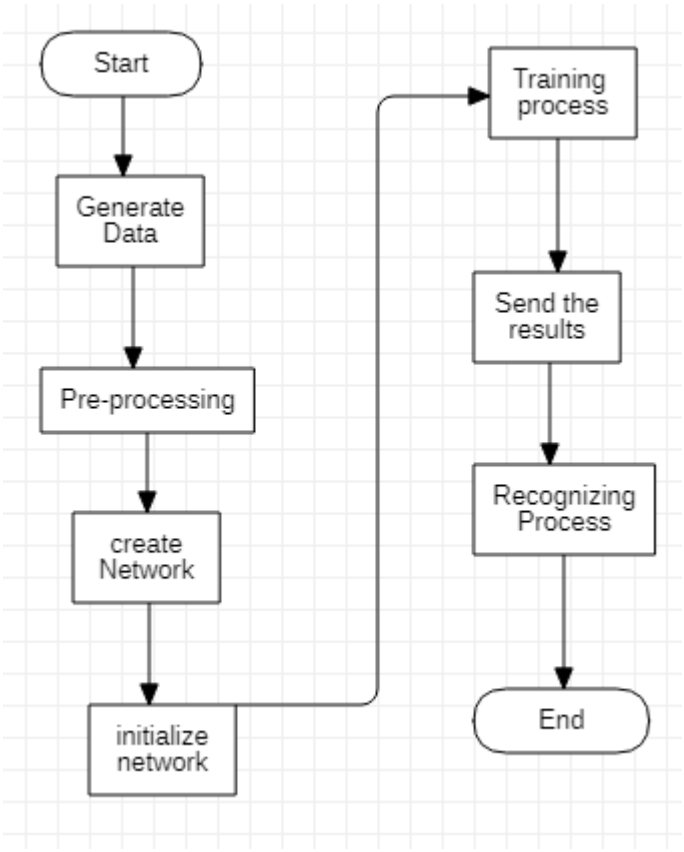

Figure 1: Flowchart

GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modeling language.
5. Encourage the growth of OO tools market.

6. Support higher level development concepts such as collaborations, frameworks, patterns and components.
7. Integrate best practice.

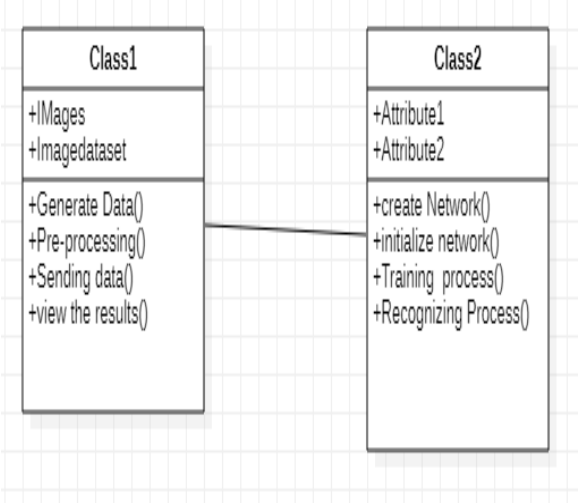

Figure 2: Class Diagram

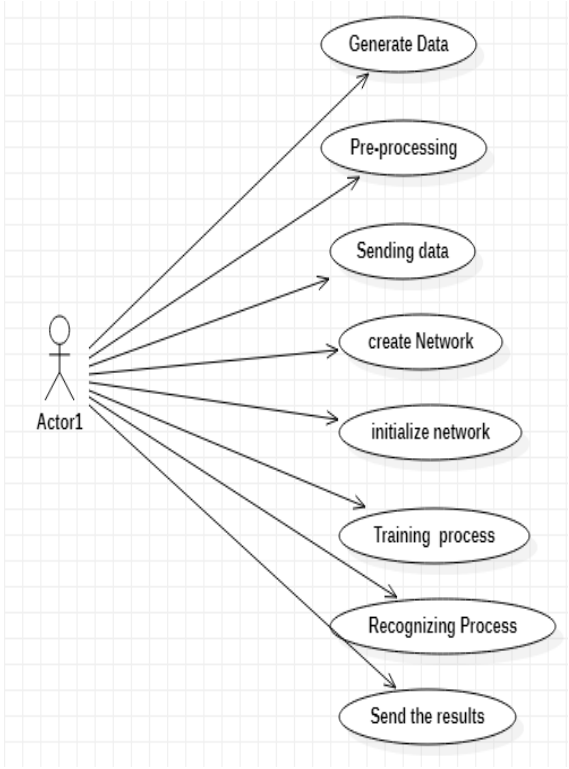

Figure 3: Use case diagram

Implementation

In the process of implementation first

Generate a training set:

It which has to make sure that whether it is large enough to yield statistically better and improved results. And it is representative of the data set as a whole .And we need to assume that the test set meets the conditions as mentioned and it also generalizes new data also. Generally, the database of the signatures serves as a proxy for all the signatures. Model had already been learned regarding the training data.

Pre processing:

It is the process of preparing the raw data and making the data be enhanced for the learning model.This step is termed to be most important step while creating a machine learning model. Because while training the data and receiving the data not every time we get the clean and formatted data.And while doing any kind of operation with the data,it is considered very important to clean the raw data and keep it in a formatted way.

Create Neural Network:

We opted 2 ways to create a neural network

From Scratch: this is a good learning exercise because it can teach us how the network work.

Using a Neural Network Library: We use Keras and Tensor flow to build such type of neural networks.

Initialize the Network:

1) Firstly, initialize the chosen parameters.
2) Then, compute the optimization.
3) Repeat the above mentioned steps.

Training process:

It is an organized and authenticated process to improve the knowledge and workforce of the dataset.

Recognition process:

These signatures nake a feature set and we train the model for writer independent classifier and evaluate using the test set.

Conclusion and Future scope:

In this research, we study the problem of offline-handwritten signature recognition with the main focus to improve recognition performance by applying the novel technique of deep learning. We use two strategies of deep learning, that are 1) transfer learning from pre-trained model of AlexNet and VGG16, and 2) create new CNN from scratch. We demonstrate through experimentation that our proposed method using deep learning technique can improve the accuracy rate of handwritten signature recognition. We also do the comparison in terms of the training time of both strategies of deep learning. Our dataset of this research is collected from users who use their handwritten signature in daily life.

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