SIGN-VEIN AUTHENTICATION SYSTEM FOR THE SPEECH AND HEARING IMPAIRED USING CNN

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Abstract*—*In the current world of authentication, the users are typing their passwords in their keyboards, which are nowadays easily being cracked by using infrared cameras. And moreover, even if they type the password on the touch panel, impressions are formed on the screen which will help in cracking the password.The issue of security arises to the users. DactAuth - Sign Language based Authentication enables the users, especially the Deaf and Dumb, to sign into their systems with the gesturing of Indian Sign Language (ISL). This system will help provide a secured authentication system to The Speech and Hearing Impaired people with the use of Indian Sign Language (ISL). This authentication system has an active feed that helps you to provide sign language as input which is recognised by the camera and provides access to the user. The hearing and speech impaired persons can use sign language to get authorized by the system. This will help in securing the passwords from the infrared cameras. The users give their input without the smart gloves, in front of the camera with their bare hands alone.

Keywords— Password, Deaf & Dumb, Sign Language, Authentication, Infrared Camera, Cracking

I. INTRODUCTION

The long-term goal of our research is to create a medium of communication for hearing and speech impaired (i.e., deaf and dumb) people. Since the latter use sign language, there is currently no meansof communication between such people who areunfortunately in significantly large numbers in a large country suchas India.

Sign Language is an ultimate tool for the Speech and Hearing impaired people to communicate to the world. In the existing user authentication systems, the users are typing their passwords in their keyboards, which are nowadays easily being cracked by using infrared cameras. And moreover, even if they type the password on the touch panel, impressions are formed on the screen which will help in cracking the password. In the recent years

In recent years, there has been a good amount of research on sign recognition. Some of the earlier sign recognition systems attempted to identify gesturesusing glove-based devices that would measure the positionand joint angles of the hand. However, these devices arevery cumbersome and usually have many wires and cables connected toa computer. This has brought a thought to create a system without any physical devices by just showing the signs using their bare hands.

This system achieves the objective of detecting the number of finger points (like the facial points) with the concept of boundarytracing combined with finger tip detection using the finding of contour and convex hull. It handles gaps, if any, during boundary detection by rejoining the trace at a particular position.

The proposed system allows Speech and Hearing impaired persons to use the Sign Language in the authentication system to sign in. The users will give their input without the smart gloves (or any physical device) in front of the camera with just their bare hands. This system is aimed to be reliable and cost-effective when compared to the existing systems. Currently, there are no authentication systems that use Sign Language for users to authenticate.

II .RELATED WORK

The main focus of this paper is on using a simple, effective algorithm for the detection of the signs

showed by the users.We describe some of the related works for concept sign based user authentication in this section.

There have been many previous works which extractedcertain features of the hand for sign or gesture detection.
Some common features extracted include contours, finger points distributed along hand
(fingertips, joints) and frames of the displayed signs.

There are many systems for detecting the sign language shown by the deaf and dumb people. In context of the limitations posed by the schemesdiscussed above there is a need to devise an efficient and robust authentication system for the deaf and dumb.

The related works signify that a wide variety of researches are already existed in the field of Indian Sign Language recognition system. However, developing an user authentication system based on sign language recognition is an inattentive area.

III.EXISTING SYSTEM

There are a lot of security and privacy threats to the users nowadays.In the existing system for authentication , the users are typing their passwords in their keyboards , which are nowadays easily being cracked by using infrared cameras. And moreover, even if they type the password on the touch panel , impressions are formed on the screen which will help in cracking the password.

IV.PROPOSED SYSTEM

The proposed system allows users to authenticate themselves into the system by gesturing Indian Sign Language (ISL). This helps in securing the passwords from the thermal cameras and confidential data leak due to breaches or illegal sign-ins. In this system the users do not touch any physical device, but just display signs using bare hands. The system also uses palm dorsal vein scanning along with the sign language gesturing for added security and privacy. This system is aimed to be reliable and cost-effective when compared to the existing systems. Currently, there are no authentication systems that use Sign Language for users to authenticate. And to the best of our knowledge, this is the first attempt to apply a CNN for Palm-Dorsal vein pattern authentication, which is the second step in the Sign-Vein Authentication system.

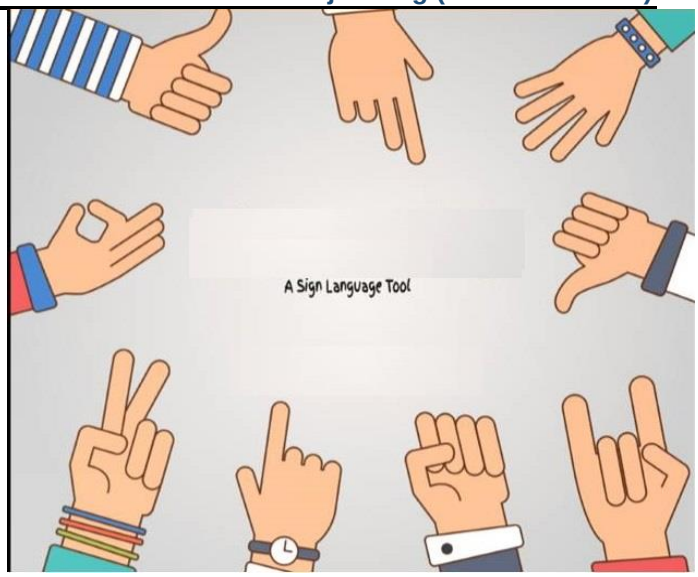

Fig: **THE PROPOSED SYSTEM**

First the user is validated before logging in by showing signs as password. Then the algorithm is used to hide the password of the user and checks using the Advanced Encryption System(AES). This can also be done by adding the decay bits to the original bits and then check the sign showed by the user. The sign can be converted into the binary bits so that it can save memory. If this criterion fails, an alert message is sent to the original user.

a) TRAINING MODULE:

Image acquisition is an operation of capturing the images of the hand gesture representing different signs. In this system a customised dataset is trained for training and testing. The dataset contains 36 different sign languages which include A-Z (alphabets) and 0-9 (Numbers). The resolution is same for all the images so as to lower the computational effort required for processing.

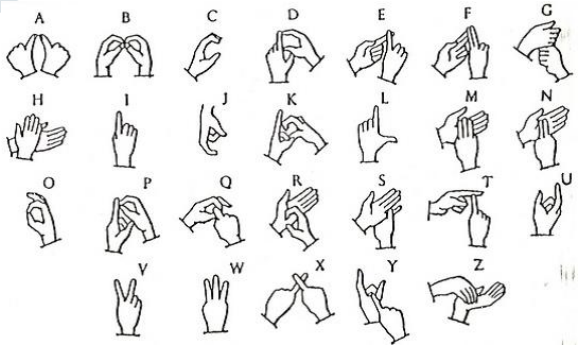

Fig: Sample Signs

b) PREPROCESSING MODULE

In machine learning, pattern recognition and in image processing, feature extraction start from an initial set of measured data and build derived values (features)

intended to be informative and non-redundant, facilitating the subsequent learning and generalisation steps, and in some cases leading to better human interpretations. Feature extraction is a dimensionality reduction process, where an initial set of raw variables is reduced to more manageable groups (features) for processing, while still accurately and completely describing the original dataset.

The Principal Component Analysis (PCA) technique is used to extract descriptors from the segmented hand gesture images. PCA is a novel feature extraction method which is robust against rotation, scaling, occlusion and variation in viewpoint. Here the feature extraction also includes the Knuckle Point recognition for easier identification.

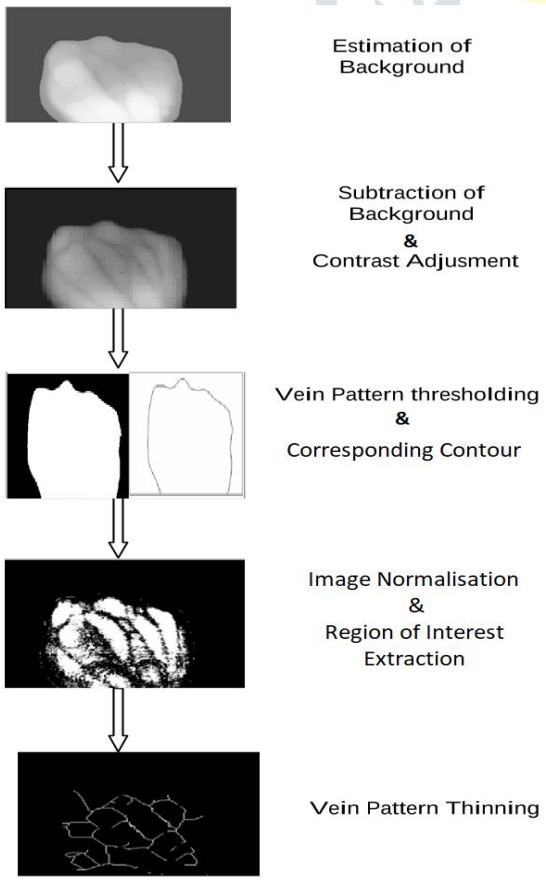

Fig: Execution OfPreprocessing

c) TESTING MODULE

The user can get logged into the system only if he has signed up with a unique username and has been authenticated. The details of the users are stored in a database using PostgreSQL. The Login Form module presents site visitors with a form containing username and password fields. If a user enters a valid username & password combination, he/she will be granted access to the data. Once logged in, the module presents the user with a Logout button and inactive users, for a predetermined period of time, will be automatically logged out. Here the users can enter the password via virtual keyboard or by gesturing sign language before the camera.

Machine learning is needed to make available for above features.In our project we use the opencv, numpy, scipy and scikit packages for smart user-authentication system.We Our main concept is to help the deaf and dumb by developing a user-friendly authentication system.This proposed system is combined with multiple ideas and concepts which are going to be integrated in such a way that the targeted audience are satisfied.

IV. CONCLUSION

Privacy and security are major problems in the modern world. The Speech and Hearing Impaired people also need a system in their native Sign Language. Thus Sign-Vein Authentication system provides a secured authentication module for the ease of Deaf-Dumb people with the use of Indian Sign Language (ISL) as the main priority. In this module, Euclidean Distance transformation is employed for feature extraction. CNN is used to classify the signs which give better accuracy even with less number of feature set. The system also includes Palm Dorsal Vein Scanning after the initial authentication for privacy and added security. This two-step authentication is highly robust and secure, thus preventing illegal sign-ins and breaches. Palm vein patterns are invisible and virtually impossible to forge, making the system highly secure. The digitally encrypted palm vein patterns cannot be read by any other system. The user need not want to touch the palm vein sensor, eliminating the possibility of smudging. In this paper, vein pattern authentication using a Convoluted Neural Network (CNN) is proposed. The main advantage of the CNN over other traditional approaches is its ability to simultaneously

extract features, reduce dimensionality of data, and classifying it using single network structure. Also, the method requires only minimal steps for image pre-processing since the CNN is robust to noise. The system is also much more accessible for The Speech and Hearing Impaired people.

In the future works, the System can be made more efficient by identifying the user using the color, size and the patterns of the hands of the users. Further the palm dorsal vein can be scanned along with multimodal bioetrics.

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