3D Hand Geometry Based Smart Attendance System using Image Processing

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ABSTRACT: Biometrics, which can be used for identification of individuals based on their physical or behavioural characteristics, has gained importance in today's society where information security is essential. Hand geometry based biometrics systems are gaining acceptance in low to medium security applications. Hand geometry based identification systems utilize the geometric features of the hand like length and width of the fingers, diameter of the palm and the perimeter. The proposed system is a verification system, which utilizes these hand geometry features for user authentication. This project introduces an inexpensive, powerful and easy to use hand geometry based biometric person authentication system. One of the novelties of this work comprises on the introduction of hand geometry's related, position independent, feature extraction and identification, which can be useful in problems related to image processing and pattern recognition. Today students' (class) attendance became more important part for any organizations/institutions. The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. This paper presents the manual students' attendance management into computerized system for convenience or data reliability. So, the system is developed by the integration of ubiquitous computing systems into classroom for managing the students' attendance using palm print scanner. The system is designed to implement an attendance management system based on palm print scanner which students need to use their palm to success the attendance where only authentic student can be recorded the attendance during the class. This system takes attendance electronically with the help of the webcam, and the records the attendance in a database. Students' roll call percentages and their details are easily seen via Graphical User Interface (GUI).

Keywords: Image Processing, 3-D HAND GEOMETRY, Authentication, Boimetrics, etc.

I.   INTRODUCTION

Biometrics authentication is the ideal solution to the security requirements. Not only it is much more user friendly than remembering a number of passwords or carrying around a card, but it is something that cannot be stolen or cracked. The biometric authentication systems use human traits, which are unique to the individual, and is neither stolen nor duplicated. Biometrics authentication is truly the future of personal identification. Hand geometry based biometry systems exploit features on the human hand to perform identity verification. Due to limited discriminatory power of the hand geometry features, these systems are rarely employed for applications that require performing identity recognition from a large-scale database. Nevertheless, these systems have gained immense popularity and public acceptance as evident from their extensive deployment for applications in access control, attendance tracking and several other verification tasks. As for system development and implementation, it should be able to help the lecturers to managing their student attendance systematically. The system must have database that contains student information and it must be able to help lecturer to manipulate data, update database, alert lecturers accordingly, and nice interface to make it easier to use. Finally, the attendance system must be user friendly for commercial purpose. This system will regulation about attendance to class, and implement it to develop the system that will do all the attendance management automatically.

Project Scope

The renewed interest in digital identity of people has opened up several areas of bio-metric analysis which in the past received less attention. These areas include handgeometry,3D geometry and analysis of finger structures. Many characteristics ofhuman beings are used for identification of which fingerprints, voice and face havebeen the most prominent. Electronic methods also use voice, face, iris and handfeatures to provide unique keys for people identification. Machines are very limitedin terms of their capability to recognise human beings from their hands alone. This scope of proposed work in below data-driven areas:

- Banking Sector -As most users of banking services expect a friction-less access to them and passwords fail to meet these expectations, Biometrics can be a tool to solve the problem.

- Financial institutions in general - Employees of credit unions, and other financial establishments have always had a problem to memorize a lot of various passwords they need to work do biometric can automate it.

- E-Commerce Business - Do biometrics will secure the transaction between the customer and the dealer for maintaining long term customer relationship?

- Cloud-based Biometrics -Cloud computing is gaining a lot of popularity in the corporate world irrespective of the size and nature of business. Do biometrics can secure personal data?

- Law enforcement agencies - Being extremely effective for security purposes, can biometric technology will be widely helpful for police?

Proposed System:

Accurate biometric authentication is the focus of attention in today's information society, as it is a requirement for automated identification, criminal or forensic applications, and access control systems. Many physiological attributes are appropriate for authentication, including fingerprint, palm veins, face characteristics, palmprint, hand geometry, etc. A palmprint consists of multiple characteristics which can be used for authentication: principal lines, wrinkles, and epidermal ridges. Using only the principal lines of the palm, a person can be identified with high confidence. Hand geometry measurements used for this purpose can be finger lengths, widths and area, palm area, palm height and width, finger proportions, etc. Having a high resolution image, the measurements of the hand and characteristics of the palm are located in a single image. Combining the two metrics provides a better authentication accuracy without additional requirements from a user viewpoint. This paper introduces a method for extracting features of both palm and hand, and combining them for best results. The proposed method offers a solution for a low-cost biometric authentication system, as the hardware equipment for capturing the hand image may consist of inexpensive, high-resolution cameras.

• Large data storage at the required of decentralized data storage as well as information system.

• The different attack issues in centralized database architectures.

• There is no automatic attack recovery in central data architectures.

• The decentralized architecture provides the automatic data recovery from different attacks.

After the analysis of this system we move to develop the decentralized system architecture, and distributed computing provide parallel processing in distributed environment.
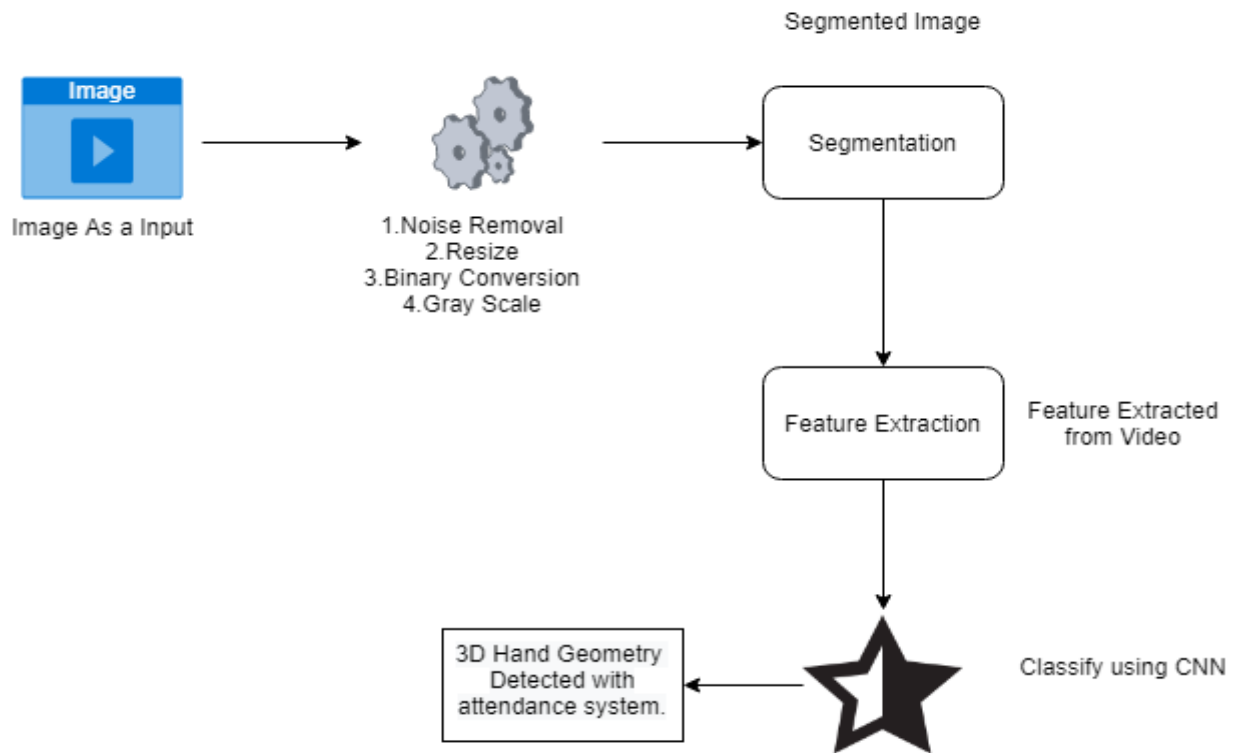
Fig.1: System Architecture

II.   **OBJECTIVES**

- Hand attaendance systems offers several benefits: –

- Usually considered less intrusive than fingerprints, retinal, etc.

- Environmental factors are not an issue, such as, dry weather that causes the drying of the skin.

- The Different Attack Issues in Centralized Database Architectures.

- System is Inexpensive and Budget-Friendly.

- Processing time is quite low as compare to existing system.

- Proposed System uses different algorithms to increase accuracy rate.

- It is user friendly application.

- Storing database unlimited and solve security issue.

- Easy to use.

Results:
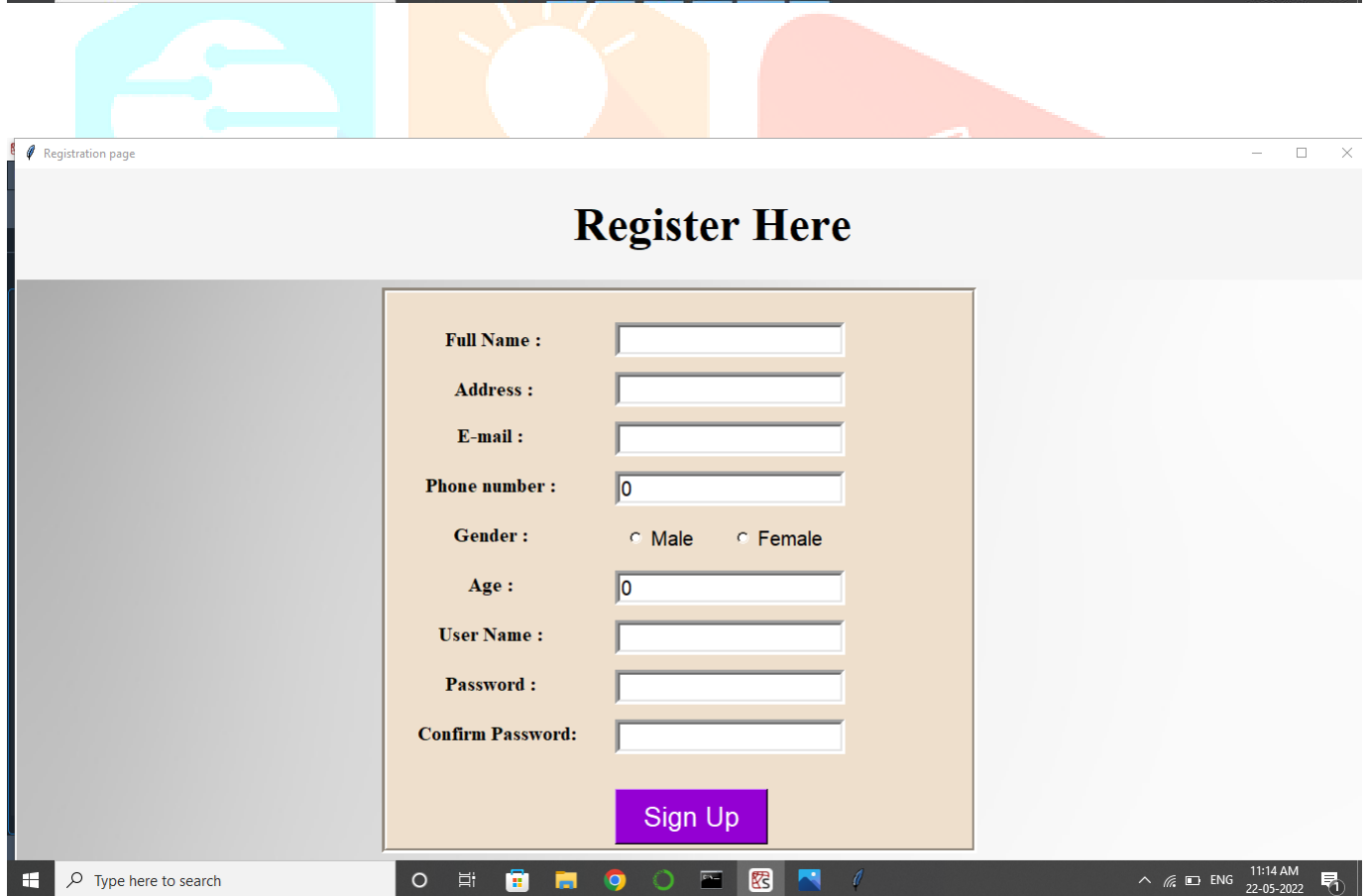
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3D Hand Geometry Using Machine Learning — □ ✕

3D Hand Geometry Based Smart Attendance System

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III. CONCLUSION

This project has presented a new approach to achieve more reliable personal authentication using simultaneous extraction and combination of 3D and 2D hand geometry features. The proposed system acquires hand images in a contact –free manner to ensure high user friendliness and also to address the hygienic concerns. Simultaneously acquired range and 2D images of the hand are processed for the feature extraction and matching. We introduced two new representations, namely finger surface curvature and unit normal vector, for 3D hand geometry based biometric measurement. Simple and efficient metrics are proposed for the matching of pair of 3D hand images. Match scores from 3D and 2D hand geometry matchers are combined to obtain a highly reliable authentication system. Our research also suggests that significant performance improvement can be achieved by combining hand geometry information extracted from user's 2D and 3D hand images. we discussed the way to measure the attendance of students. A preliminary experiment demonstrates a teacher can classify any student's attendance according to their use. Any teacher can take the records and generate graph according to their use.

Acknowledgment

REFERENCES

[1] "R. Sanchez-Reillo, C. Sanchez-Avila, and A. Gonzalez- Macros, "Biometric Identification through Hand Geometry Measurements", IEEE Trans. PAMI, 22(10):1168-1171, Oct. 2000.

[2] "A. K. Jain, A. Ross, and S. Pankanti, "A Prototype hand geometry-based verification system", Proc. AVBPA, Washington DC,166-171, Mar.1999.

[3] "A. K. Jain, and N. Duta, "Deformable matching of hand shapes for verification", Proc. International Conf. Image Processing, 857-861, Oct.1999

[4] A. Kumar, D. C. M. Wong, H. C. Shen, and A. K. Jain, "Personal verification using palmprint and hand geometry biometric", Proc. AVBPA, Guildford, U.K., 668-675, 2003

[5] "S. Malassiotis, N. Aifanti, and M. G. Strintzis, "Personal Authentication using 3-D finger geometry", IEEE Trans. Info. Forensics Security, 1(1): 12-21, Mar. 2006.

[6] "D. L. Woodard and P. J. Flynn, "Finger surface as a biometric identifier", CVIU, 100(3): 357-384, Dec. 2005.

[7] "N. Otsu, "A threshold selection method from gray-level histograms", IEEE Trans. Systems, Man and Cybernetics, 9(1):62–66, 1979.

[8] "W. Xiong, K.A. Toh, W.Y. Yau, X. Jiang, "Model-guided deformable hand shape recognition without positioning aids", Pattern Recognition, 38(10): 1651-1664, Oct. 2005.

[9] "D. L. Woodard and P. J. Flynn, "Finger surface as a biometric identifier",CVIU, 100(3): 357-384, Dec. 2005.

[10] "N. Otsu, "A threshold selection method from gray-level histograms", IEEETrans. Systems, Man and Cybernetics, 9(1):62–66, 1979

[11] "W. Xiong, K.A. Toh, W.Y. Yau, X. Jiang, "Model-guided deformable handshape recognition without positioning aids", Pattern Recognition, 38(10): 1651-1664, Oct. 2005

[12] Shi Chuan Soh, M. Z. Ibrahim and Marlina Binti Yakno, "A review: personal identification based on vein infrared pattern", Journal of Telecommunication, Electronic and Computer Engineering, vol. 10, No. 1-4, 2018, pp. 175 – 180.

[13] Nesrine Charfi, "Biometric recognition based on hand schape and palmprint modalities", PhD thesis. Ecole nationale sup´erieure Mines-T´el´ecom Atlantique, 2017.

[14] Agbinya, J.I, "Hand Pose Biometrics Models", Proc. WITSP'2004, 3rd Workshop on the Internet, Telecommunications and Signal Processing Adelaide, South Australia, 2004.

[15] Gonzalez, S., Travieso, C. M., Alonso, J.B. and Ferrer, M.A, "Automatic biometric identification system by hand geometry", Proceedings. IEEE 37th Annual 2003 International Carnahan Conference on Security Technology, pp. 281 – 284