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Innovative Human Identification System Using Multiple Biometrics

Mr. P. Saravanabhava¹ , Mr.S.Aravindh² , Dr.S.Venkatesan³

Assistant Professor, Dept. of IT, Dhanalakshmi Srinivasan College of Engineering & Technology,
TamilNadu, India¹

Assistant Professor, Dept. of CSE, Bharath Institute of Higher Education and Research, TamilNadu, India²

Professor and Dean, BS Abdur Rahman Crescent Institute of Science and Technology, TamilNadu, India³

ABSTRACT: This paper proposes a human identification system using Gait, Facial elements, Palm and voice acknowledgment on biometric elements and is used to give an effective validation. The framework proposed in this paper takes one of a kind of human personalities which is given by the biometric elements of each person. This system assures to give secure access to the authorized clients without requiring them to recollect their check subtle elements or convey anything more. It gives a dynamic and speed calculation for approving the clients. The usage includes recording the step highlight of a man, which shows his/her strolling style and the qualities removed from them is extraordinary for every one of the people. The step highlight is combined with other remarkable components of people like palm print and facial components will give effective and secure validation framework. All the procedure is done with the help of only three cameras and it is finished by picture handling. The usage utilizes calculation which is dynamic, quick and plays out the proposed assignment adequately.

KEYWORDS: Image Processing (MATLAB), HMM, Eigen vector algorithm.

I. INTRODUCTION

The biometric identifiers used in this system are Gait Scan, Palm Scan, Face detection and voice recognition. These Biometric identifiers are measurable and are used to describe the individuality of a person. In banks, the customer can access the locker only after password or card verification. If the customer unable to remember the password or card details then the access will not be given. This system identifies the customer by matching their gait, face, palm and voice biometrics. If any one of the biometric element does not match with the user, he or she will be considered as invalid user.

This system concentrates on, (1). Creating an automatic verification which includes segmentation and matching. (2). Multiple source of detection are used for higher accuracy. This system checks for person's match with all the four biometric elements instead of checking only single parameter.

If any one of the four parameters is not matching the user is said to be an invalid user. The combination of all the four parameters makes the system works efficiently. The four biometrics are Gait, Palm, face and voice detection.

A. Gait Detection

Each person has a unique style of walking. The gait cycle is formed by the motion of the head, the swing distance of each hand, lift of the foot for each step, the distance between the feet and the height of the person are various features that need to be included in a gait scan.

The same style is repeated again and again in the process of walking. The various details collected during this cycle is fed into the systems data base. The features like wave forms of the head movement, height and the distance between the feet at the end of a cycle are saved in the database.



TABLE I INPUT TO THE GAIT PHASE

Height	Distance Between Foots	Head Swing
6 ft	46	76

Separate wave pattern is formed for each parameter during the gait scan, so that filtering is carried out at all stages of comparison. No specific starting point for the wave pattern and it can start at different positions.

B. Palm Detection

The Palm Scanning is a second step in detection of the user. The user’s palm features are fed into the database. The identical features of the user are extracted from the palm of the person by taking a snapshot of the palm. After taking the snapshot, the features of the palm is taken into consideration. This process is done by eigen palm detection methodology.

The inner side of our palm has principal lines, wrinkles and ridges. Palm print image is collected from a flat palm scanner device in which a wooden strip marks the position on which the crossing of index and thumb finger has to be placed so that all palm prints will be aligned from left to right

C. Face Detection

Face Scanning is the third step in detection of the client or user. In this stage the users face elements are taken and fed into the database. The indistinguishable components of the user are extracted by taking a solitary depiction of the face. It is done by eigen confront location technique.

At first a standard picture of a person by still camera or by capturing the image from a live video is put away. At that point in every validation session the current picture of the individual is contrast and the put away gauge picture. Then the design coordinating calculations are used to figure out whether there is a usable head in that picture.

D. Voice Detection

Voice detection is the fourth step. The voice is perceived utilizing Hidden Markov Model[2]. The pre handling is done to change the information discourse into advanced frame that can be perceived by the recogniser. Next stride is the element extraction from which the parameters that can be processed are extricated.

II. LITERATURE SURVEY

Mr. Boyapati[1] proposed a voice preparing module with CVSD source coding for tactical wireless systems. This tactical wireless systems face several challenges for example, in sufficient BW, secure communication, reusability and also more energy consuming. The data transmission involved by digitally encoded speech/audio signal can be reduced by using efficient source coding and decoding techniques. One such source coding/decoding algorithm is CVSD. The CVSD is one kind of Adaptive Delta Modulation(ADM). The hardware resource utilization is compared for plain voice as well as with CVSD on Cyclone-V. The result comes out that the voice preparing module with CVSD has taken less number of logic elements as compared to plain voice.

Ms A.Maheswari [2] Multimodal biometrics involves the combination of more than one characteristic. It involves two modes of operation.

- ◆ Database creationmode
- ◆ Feature extractionmode

In database creation mode, the database is created with the palm print, graphical images and voice data samples. In the feature extraction mode, the features of the palm print are extracted and the transformation of the graphical images is being carried out. Weber’s Local Descriptors is a local feature extractor. This texture descriptor performs superior to other descriptors. It divides an image into number of blocks and then calculates WLD for each block and then concatenates them.

Mr Hyder Ali [3] proposed on Gait recognition system can be classified depending on the below diagram.

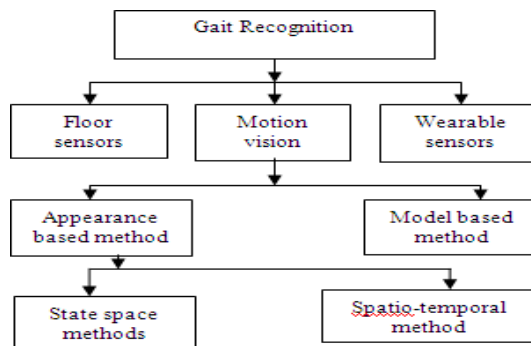


Figure.1 Classification of gait recognition system

The provided database has four kinds of walking pattern which are slow, fast, incline and carrying a ball walk. Each

subject walking pattern has six kind of view in different angles. Each view captured 340 frames that can be calculated minimum 14 gait cycles and each cycle has generally 18 to 20 frames. One cycle frames are combined and prepared a GEI frame. So one subject got minimum 14 GEI images. For the training and testing, 10 GEI frames selected for training and 4 GEI frames selected for testing to perform the experiment for one subject. Total number of GEI training and testing frames are $13 \times 10 = 130$ and $13 \times 4 = 52$ frames respectively. Euclidean distance algorithm, two performances have been measured which are namely recall and reject. For recall, if a test image is correctly identified to an image of the same person from the training database it is called Correct Classification. If the test image is incorrectly matched with another subject images it is called False Acceptance. If an image is rejected by the system which from the training database then it is False Rejection. For reject, if any test frame from the unknown test cannot identify by program then it Correct Classification. If the test image can detect by program then it FalseAcceptance.

Zhaoxiang Zhang[5] Stride is the most reasonable biometrics on account of canny visual observation. In observing scenes, individuals are normally far off from cameras, which makes most of biometric features no longer available. Most of existing systems use face for identification. The shortcomings are obvious, for example, unexpected see point and impediment cause full faces can not be captured, separate achieves low-determination confront picture. In this manner, face can not generally accomplish acceptable results in practical. In differentiate, walk is a behavioral biometric, including not only individual appearance, such as height, leg length, shoulder width, but also the dynamics of individual walking. Compared with other biometrics, gait is remote accessed and difficult to imitate or camouflage. The wearable sensors are attached to the key points of different body parts, selective collect the speed, acceleration, position and other information. Commonly used devices include light senses (such as reflectors, moving lights), acceleration sensors, magnetic sensors, gyroscopes,etc.

Michael Fitzgerald Nowlan [6] proposed a single sensor composed of an accelerometer and gyroscope is used to record gait characteristics. The accelerometer/whirligig blend gadget utilized as a part of this work is the Nintendo Wii Remote (gives accelerometer) utilized as a part of conjunction with the Nintendo Wii Motion Plus attachment (provides gyroscope). When joined together, the single device measures roughly 7.5” x 1.5” x 1.5”. With 95% accuracy, this approach is able to identify to which person a gait cycle belongs.

Chathuri M. Senanayake[7] performed on two wearable sensor frameworks were executed to procure walk parameters for step stage location. One sensor framework includes Force Sensitive Resistors (FSRs) and Inertial Measurement Units (IMUs) to acquire foot pressure patterns and knee angle. The second sensor system comprises of only IMUs to acquire hip, knee and ankle angles. The GPDS based on Kinetic and Kinematic parameters detected all gait phases in the expected sequence, during normal gait. Therefore the detection reliability of the system for a total of 270 (45 steps x 6 subjects) steps was 100%.

Jin Wang[8] distinguishing people for counteractive action of psychological militant assaults. Numerous biometric advances have developed for recognizing and checking people by breaking down face, unique mark, palm print, iris, walk or a mix of these traits. Measuring the similarity of temporal sequences are based on a distance

metric, the HMM-based methods model phases of a gait as hidden states. The HMM-based methods are generally preferable to the other methodologies because they utilize both the similarity information and the probability of shapes appearance. HMMs represent different phases of a gait as hidden states. They assume that the current state is only influenced by the previous state and is independent of the history state. Observation probabilities and transition probabilities are calculated via training input data.

Yi Huang[9] a confront acknowledgment or human step acknowledgment framework for the most part involves the accompanying basic segments. Initial, a few preprocessing operations are performed. For face acknowledgment, the face pictures are adjusted and edited by settling the areas of the two eyes. Histogram equalization may be also utilized. For face recognition, we aligned all the gray-level images by fixing the locations of the two eyes and normalizing the cropped images to 36×36 pixels, followed by histogram equalization. For the CMU PIE and FERET databases, the locations of the two eyes are manually labeled. For face recognition, we aligned all the gray-level images by settling the areas of the two eyes and normalizing the cropped images to 36×36 pixels, followed by histogram equalization. For the CMU PIE and FERET databases, the locations of the two eyes are manually labeled and demonstrates the effectiveness of our image-to-class distance.

Mr.Vipin Kumar[10] performed on Palm print acknowledgment has been examined over the previous years, amid this period a wide range of issues identified with palm print acknowledgment has been tended to. Scientists have concentrated on creating exact check calculation. Different element extraction and coordinating calculation have been proposed. There are two types of palm recognition research, high resolution and low resolution approaches. High resolution approach employs high resolution images while low resolution approach employs low resolution images. After getting ROI of Palm picture we apply taking after channels for highlight extraction to take out the variety brought about by pivot and interpretation. The picture is examined from basic level scanner. A settle point is being determined to the crossing of Thumb and index finger. After the scanning palm samples, we set Region of Interest by using following technique. The new technique of getting ROI and simple matching definitely will reduce the complicacies and errors.

Swati Warma[11] It protects against repudiation by the user. Biometrics gives a similar level of security to all clients not at all like passwords and is very impervious to animal constrain attacks. A system performing distinguishing proof matches the new attributes against the ace layouts of numerous clients bringing about different match values (one to many coordinating). Palm print is another biometric methodology which can be utilized for verification of a man's character on account of its abundance. Palm print not just has the data accessible on the unique mark yet it has significantly more measure of subtle elements as far as important lines, wrinkles and wrinkles. Gathering approaches in light of advanced scanners, computerized cameras and camcorders require less exertion for framework outline and can be found in office situations. Mr Badrinath[12] palmprint which is the district amongst wrist and fingers as biometric highlight is moderately new an approach. Palm print has highlights like surface, wrinkles, standard lines, edges, and particulars focuses. Palm print is isolated into 32×32 sub-blocks. Mean for each sub-block is calculated to approximate the reflection of the image. Zernike moments separate from the sub-images of the palm print are used as features, which provides good discrimination ability and are used for palm print based verification.

The order of Zernike moments determine the detail of information regarding palmprint. Higher the order of moments, greater the details of the palmprint image. The Zernike moments of low-order are extracted from sub-images of palmprint are used as features. It is watched that palmprint highlights utilizing low request Zernike snapshots of all sub-pictures is more segregating than high request zernike snapshots of the whole palmprint (i.e 1×1 sub-image). Georgia [13] The attributes of your walk may not be as unmistakable as the swaggering of John Wayne or the Sashay of Joan Collins, however your walk may in any case be sufficiently remarkable to recognize you at a distance-along or among a group of people. Gait recognition technology is a biometric method (i.e.,) a one of a kind natural or behavioral ID trademark, for example, a unique mark or a face. Despite the fact that still in its infancing, the innovation is developing in essentialness as a result of government studies, such as the Georgia Tech extend.

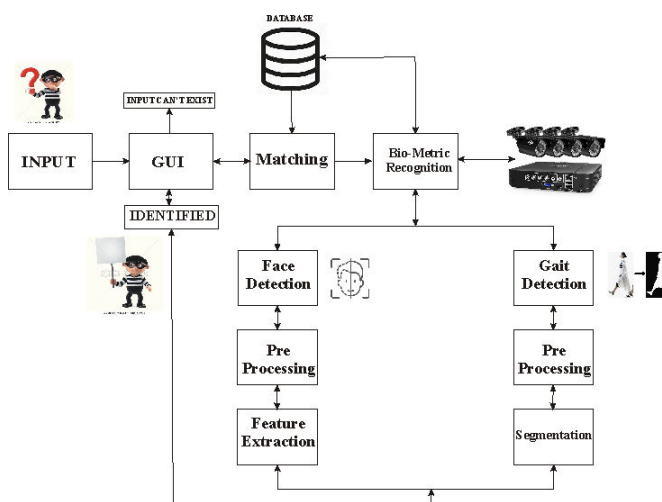
Step examination has been critical in the wellbeing field for quite a while. Essential changes in somebody's strolling example can be an effectively marker of the onset of parkinson's diseases, multiple sclerosis and normal pressure hydrocephalus(NPH). NPL [14] The National Physical Laboratory has built up a mobile stride acknowledgment framework that, in blend with other tools, can help track an individual however a CCTV checking territory by examining the way that they walk. NPL is especially centered around the institutionalization of step acknowledgment measurement, distinguishing somebody by their walk. Which at present depends on various

variable including specialized hardware, timing and position. Creating standard of stride acknowledgment is important to support and develop critical security infrastructure including coded access to building and monitoring security threats.

G.Shakhnarovich [15] proposed on build up a view- Normalization way to deal with multi-see face and walk acknowledgment. An image-Based Virtual Hull (IBVH) is processed from an arrangement of monocular perspectives and used to render virtual perspectives of following and acknowledgment. Individual following and acknowledgment framework in a perfect world incorporate data from different views, and function admirably notwithstanding when individuals are far away. For ideal face acknowledgment, they put virtual cameras to catch frontal face appearance; for walk acknowledgment they put virtual cameras can be rendered at the same time and camera position is powerfully refreshed as the individual travels through the workspace. Accepted view assessed, rendering and acknowledgment have been proficiently executed and can keep running at close continuous rates.

Robert J.Orr [16] They have made a framework for recognizing individuals in light of their stride drive profiles and have tried its precision against an extensive pool of stride information. They have made client stride models in view of stride profile includes and have possessed the capacity to achieve an acknowledgment rate of 93% utilizing this component based approach.

III. SYSTEM DESCRIPTION



A. User Registration

Initially, when the user comes for the first time, he/she is made to register into the system. The process includes gait registration, face registration, palm registration and finally voice registration. The user has to register into all these scans along with his personal details like his/her name, mobile number, DOB, address, etc. Now the system is ready with all the user details and stored into the database.

For the gait registration the user has to walk in his/her normal walking style for the stipulated distance in a particular place or a specific chamber. That place has optimal lighting required for the process and has a plain background.

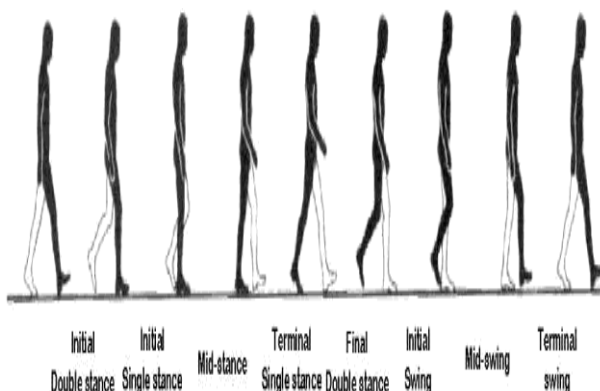


Figure.2 Different stages of a gait cycle

For voice registration the user has to speak in normal style for storing the voice in the database. Finally the palm print snapshot of the user is taken and in a similar manner where the images are taken and saved in serial order. The images of the face and palm are taken in an optimal sparkle environment.

B. User Detection

Information The user detection is the second step of finding whether the user is an authorized or not. The detection phase resides of four modules namely the gait recognition, face recognition, palm recognition and voice recognition. The user detection phase is the heart of the project saying whether the user is a valid one or not.

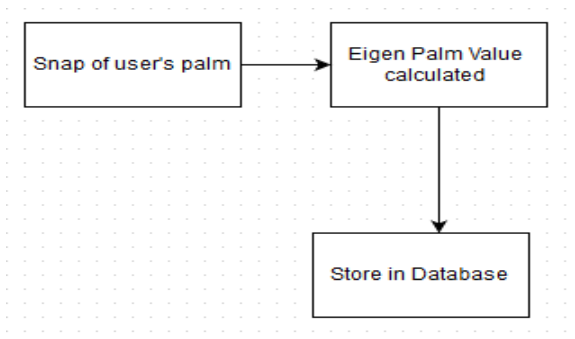
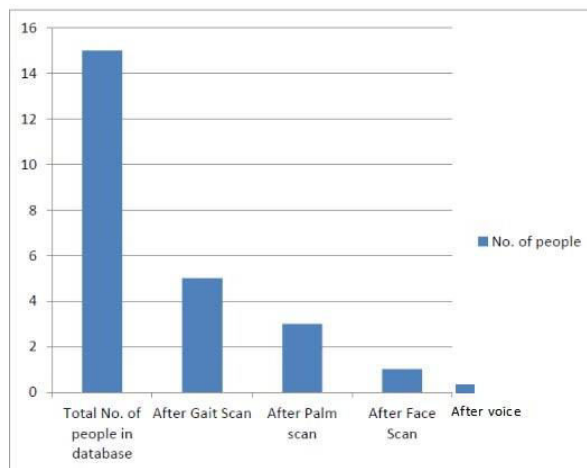


Figure.3 Palm Detection

The project has the facility to classify the people entering in four categories namely, a valid user, a new user and an attacker. Establish on the result of the user detection phase the users will be classified. If all the parameters in the detection phase get matched then he/she will be called as a valid user. If none of the parameters match then he/she is considered as a new user and if partial parameters are matching then can be an intruder.

IV. RESULT AND DISCUSSION



Graph.1 Output number of people after each scan

In this project the accuracy of using the multi model system is easily identify the person with matching their identity. The different accuracy levels by palm print reading using geometrical features, accuracy level using by face recognition, accuracy level using by gait, palm and voice recognition the combination of all the four methods are easily identify the person is valid or invalid one. Initially if only one of the scans is used it produces low accuracy results. So, the implementation uses combination of four types of scan namely gait scan, face scan, palm print and voice recognition to produce very high authentication.

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BIOGRAPHY



Mr. P. Saravanabhava¹ completed his Bachelor Degree in Electronics and Instrumentation Engineering from Annamalai University in the year 2005. Master of Engineering in Computer Science and Engineering from Annamalai University in the Year 2008. Presently Working as Assistant Professor in the Department of Information Technology for Dhanalakshmi Srinivasan College of Engineering and Technology. Areas of Interest are Digital Imaging, Artificial Intelligence and Cloud Computing.



Mr. S. Aravindh² completed his Bachelor Degree in Computer Science and Engineering from Madurai Kamarajar University in the year 2004. Master of Business & Administration from Anna University in the year 2009. Master of Technology in Computer Science and Engineering from Bharath University Year 2011. Presently Working as Assistant Professor in the Department of Computer Science and Engineering for Bharath Institute of Higher Education and Research, Chennai, Published 16 International Journals, Area of Interest are Computer Networks, Android Applications, Robotics, Digital Imaging, Optimization Techniques, Soft Computing, Optimization Techniques and Pattern Recognition.



Dr. S. Venkatesan³ completed his Bachelor Degree in Computer Science and Engineering from University of Madras in the year 2001. Master Degree in Computer Science and Engineering from Anna University in the Year 2006. Ph.D in Computer science and Engineering from Anna University in the year 2013. Presently Working as Professor & Dean School of Computer Information and Mathematical Sciences, BS Abdur Rahman Crescent Institute of Science & Technology, Chennai, Published Totally Twenty One Research papers in the International, National Journals and International, National Conferences, Area of Interest are Digital Imaging, Optimization Techniques, Soft Computing, Optimization Techniques and Pattern Recognition.



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