Human Gesture Based Recognition and Classification Using MATLAB

Suman[1], Er. Kapil Sirohi[2]

M.Tech, ECE, HCTM, Kaithal, India[1]

Asst Professor (ECE), HCTM, Kaithal, India[2]

Abstract: Gait analysis is the systematic study of animal locomotion, more specifically the study of human motion, using the eye and the brain of observers, augmented by instrumentation for measuring body movements, body mechanics, and the activity of the muscles. Gait analysis is used to assess, plan, and treat individuals with conditions affecting their ability to walk. Human identification using Gait is method to identify an individual by the way he walk or manner of moving on foot. Gait recognition is a type of biometric recognition and related to the behavioral characteristics of biometric recognition. Gait offers ability of distance recognition or at low resolution. This project aims to recognize an individual using his gait features. However the majority of current approaches are model free which is simple and fast but we will use model based approach for feature extraction and for matching of parameters with database sequences. The Feature Mapping and Extraction from input image is the major task to work efficiently. The input image has been categorize horizontally, vertically and diagonally with tracking of the boundaries of human motion using Color formatting to identify the boundaries of the moving objects. Then the input image has been provided to the algorithm to classify the image and identify from the dataset. It shows the accuracy and shows the matching dataset.

Keywords: Image Processing, GAIT, Computer Vision.

I. GAIT INTRODUCTION

Gait could be a sequence of pictures. Then spatiotemporal correlations should be taken under consideration. It aims to discriminate people by the manner they walk. It's unobtrusive. It depends on however the silhouette form of a private changes over time in a picture sequence. A "Gait Cycle" is that the time of heal strike between a similar leg. The definition of Gait is outlined as: "A explicit manner or manner of moving on foot" The human walking pattern consists of multiple recurrent gait cycles. Every gait cycle contains 2 steps. Throughout a stance part the foot is on the bottom, throughout a swing part it's upraised and touched forward. Beginning with a double support part, wherever each feet ar on the bottom, the proper foot is upraised and touched forward.

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

Image processing basically includes the following three steps:

a. Importing the image via image acquisition tools
b. Analysing and manipulating the image;
c. Output in which result can be altered image or report that is based on image analysis.

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction. Computer vision deals with developing a system in which the input is an image and the output is some information. For example: Developing a system that scans human face and opens any kind of lock. This system would look something like this.
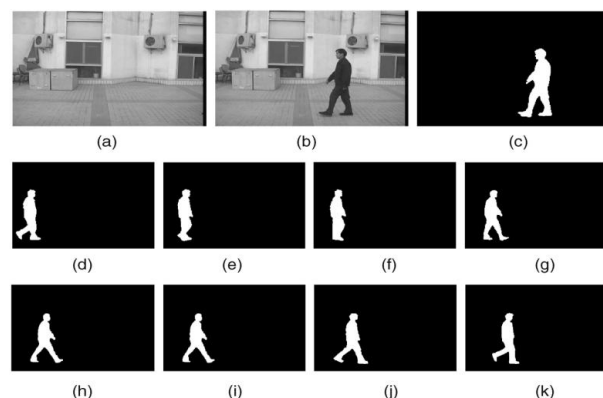

Figure 1: Sample of GAIT Images

Approaches for Gait Recognition

Some basic methods or approaches for gait recognition
• Moving Video based gait recognition: In this approach, gait is captured using a video-camera from a distance. Video and image processing techniques are employed to extract gait features for recognition purposes. For example stride, cadence, static body parameters, etc.
• Floor Sensor based gait recognition: In this approach, a set of sensors or force plates are installed on the floor and such sensors enable to measure gait related features, when a person walks on them, e.g. maximum time value of heel strike, maximum amplitude value of the heel strike, etc.
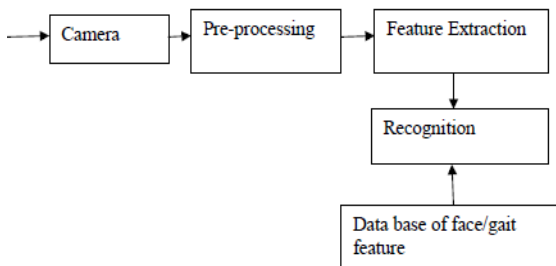

Figure 2: Block Diagram Gate Recognition System

• Wearable Sensor based gait recognition: In this approach, gait is collected using body worn motion recording (MR) Sensors. The MR sensors can be worn at different locations on the human body. The acceleration of gait, which is recorded by the MR sensor, is utilized for authentication.

GAIT Characteristics

a. Physiological

These are biometrics which is derived from a direct measurement of a part of a human body. The most prominent and successful of these types of measures are Face, fingerprints, iris, palm print, DNA etc. These are related to body. These characteristics are related to the body of a person. Fingerprints, face detection, iris, palm geometry, DNA are examples of physiological characteristics
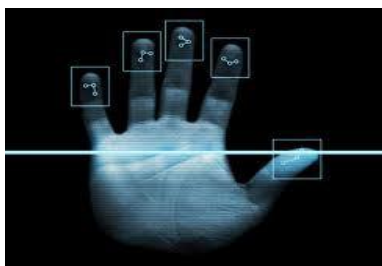

Figure 3: Fingerprints detection

Figure 4: Face and iris detection

b. Behavioral

Voice and Gait are related to behavior of the person. Extract characteristics based on an action Performed by an individual, they are an indirect measure of the characteristic of the human form. The main feature of a behavioral biometric is the use of time as a metric. Established measures include keystroke-scan and speech patterns. Biometric identification should be an automated Process. Manual feature extraction would be both undesirable and time consuming, due to the large amount of data that must be acquired and processed in order to produce a biometric signature. Inability to automatically extract the desired characteristics which would render the process infeasible on realistic size data sets, in a real-world application. These characteristics are related to the behavior of the person.
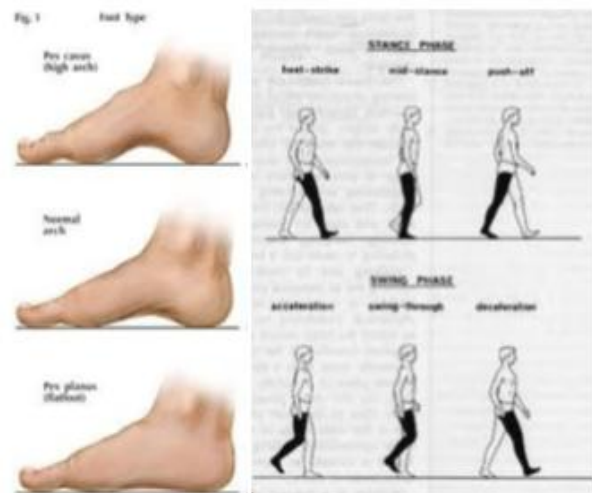

Figure 5: Gate detection

Voice and gait recognition comes. Gait features have a high intra-personal variation in shape and also it is influenced by external conditions like footwear, clothing and load carrying. The variation of gaits is also influenced by mood, ground surface condition and time difference. In spite of its individual pros and cons, gait recognition can be thought of as an effective means for human identification at a distance. The biometric security system establishes human identity using an individual's physical or behavioral attributes such as face, iris, voice or gait.
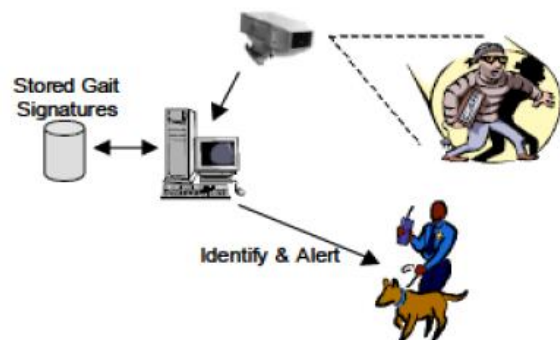

Figure 6: Gait recognition in action

One example would be to analyze the video stream from surveillance cameras. If an individual walks by the camera whose gait has been previously recorded and the individual is a known threat, then the system will recognize such individual and the appropriate authorities can be automatically alerted and the person can be dealt with before such individual allowed becomes a threat. The threat has been successfully detected from a distance, creating a time buffer for authorities to take action [5]

Analysis of Human Gait

Human gait is periodic movement. The period within walking is called the gait cycle. A gait cycle is composed of one right leg step and one left leg step. An example gait cycle is shown in fig
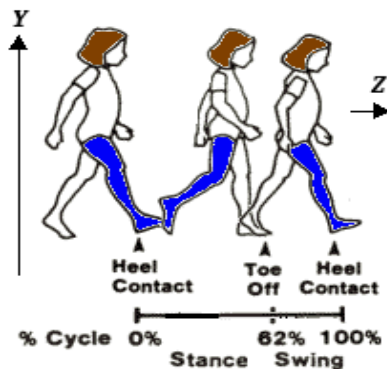

Figure 7: Example of gait cycle

Figure 8: Gait Cycle

The x directional force is that the left/right axis that goes straight out through the figure. Even once walking during a line, someone exerts a small left/right force. A novelty of this work is that the use of a rotating mechanism to live the speed of modification of the angles concerning the 3 axes. The x gyro force is that the rate of modification round the x axis; y gyro force concerning the y axis and z gyro force concerning the z axis. though AN measuring instrument are often oriented in any method, the orientation throughout this work. Together, the measuring instrument and rotating mechanism turn out six values at anybody instant in time [10]. the previous typically reflects geometry-based measurements like body-height stride and build, whereas the latter means that joint-angle trajectories of lower limbs. Intuitively, recognizing people by gait depends greatly on how the static silhouette shape changes over time .A gait is considered as being composed of a sequence of kinematic characteristics of human and most systems in existence recognize it by the similarity of these characteristics. The recognition features extracted from images should be invariant to factors other than gait, such as color, texture, or type of clothing.

II. LITERATURE REVIEW

Recognition of any person may be a task to spot folks. Human identification mistreatment Gait is technique to spot a private by the method he walk or manner of moving on foot. Gait recognition is one quite biometric technology that may be wont to monitor folks while not their cooperation. Controlled environments like banks, military installations and even airports have to be compelled to be able to quickly observe threats and supply differing levels of access to completely different user teams. Gait shows a specific method or manner of moving on foot and gait recognition is that the method of distinguishing a private by the way during which they go into this thesis, first of all binary silhouette of a walking person is detected from every frame. Secondly, feature from every frame is extracted mistreatment image process operation. Here center of mass, step size length, and cycle length ar talking as key feature. eventually BPNN and SVM technique is employed for coaching and testing purpose. Here all experiments ar done on gait information and input video [1].

Gait is set by the physical characteristics of every individual, and then is believed to be as distinctive to the person as a fingerprint is. Gait is additionally one among the few statistics that may be measured at a distance, that makes it helpful in police work applications still. during this thesis, their objective is to develop sturdy strategies for extracting discriminant gait options mechanically and passively from low-resolution video. to the current finish, we have a tendency to explore 2 completely different gait recognition techniques: a non-parametric approach that derives its classification feature from the image self-similarity plot of a walking sequence, and a constant approach that estimates express parameters of gait, viz. cadence, stride length and apparent height and uses them for classification. The tactic exploits illustrious form and cyclicity cues of human walking figure. It achieves eighty fifth detection rate and 12-tone system warning rate once tested on forty one realistic out of doors sequences [2].

Identification and verification is initial line of defence of each secure system. as a result of the advancement of technology and shrinking, the employment of mobile devices is very raised since last decade. Nowadays, mobile phones ar additional powerful than the computers of time period of last decade. Today, mobile phones hold lots of non-public and sensitive knowledge, that should be protected victimisation most reliable, robust, convenient and value effective authentication mechanisms. identity verification is one in all the 3 strategies of identification. Gait authentication is one variety of identity verification that operates on behavioral characteristics of folks. Later, totally different mathematical and machine learning ideas ar wont to analyze recorded knowledge and extract typical gait cycle for every subject [3].

Gait recognition is one quite biometric technology that may be accustomed monitor folks while not their cooperation. Controlled environments like banks, military installations and even airports have to be compelled to be

ready to quickly observe threats and supply differing levels of access to completely different user teams. Gait shows a specific means or manner of moving on foot and gait recognition is that the method of distinguishing a personal by the style during which they walk. Gait is a smaller amount retiring biometric, that offers the chance to spot folks at a distance, with none interaction or co-operation from the subject; this is often the property that makes it thus enticing. This paper planned new methodology for gait recognition. during this thesis, opening move is extraction of foreground objects i.e. human and different moving objects from input video sequences or binary silhouette of a walking person is detected from every frame and human detection and pursuit are going to be performed. once obtaining binary silhouettes of folks model primarily based approach is employed to extract the gait options of an individual. ultimately NN technique is employed for coaching and testing purpose. then they'll take a look at for the mix of NN+SVM .Here all experiments ar done on gait information and input video [4]

This paper presents a whole Optical Character Recognition (OCR) system for camera captured image/graphics embedded matter documents for hand-held devices. At first, text regions ar extracted and skew corrected. Then, these regions ar binarized and divided into lines and characters. Characters ar passed into the popularity module. Experimenting with a collection of a hundred identity card pictures, captured by telephone camera, they need achieved a most recognition accuracy of ninety two.74%. Compared to Tesseract, associate degree open supply desktop-based powerful OCR engine, gift recognition accuracy is value conducive. Moreover, the developed technique is computationally economical and consumes low memory therefore on be applicable on hand-held device [5]

Many applications, each cooperative and hostile, need the power to spot humans. This paper proposes a technique that exploits the biometric property of human gait to spot folks. one detector composed of associate degree measuring device and rotating mechanism is employed to record gait characteristics. exploitation straightforward classifiers on these feature vectors, this approach achieves ninety fifth accuracy in classifying gait cycles to people. This model-driven approach unambiguously exploits the physics of human gait through the employment of rotating mechanism forces and proves its viability for good atmosphere applications [6].

Studies show that smartphone thefts square measure a big downside within the u.   s..The prevalence of latest identification techniques for smartphones has crystal rectifier some researchers to propose biometric anti-theft measures for such devices, almost like this fingerprint authentication system for iOS. Gait identification, a comparatively recent field of study, appears to be an honest acceptable anti-theft thanks to the non-intrusive nature of passive pattern recognition in walking. during this paper, they reproduce and extend a contemporary gait recognition technique projected in Cell Phone-Based life

science by testing the technique outside of the laboratory on real users below everyday conditions. They propose however this system will be applied to make associate degree anti-theft system, and that they discuss future developments that may be necessary before such analysis is prepared to be enforced in an exceedingly release-quality product. as a result of previous studies have additionally targeted round the ability to differentiate between individual users from a bunch, they'll examine the accuracy of distinguishing whether or not or not a selected user is presently employing a system [7].

Biometric systems have become more and more vital, as they supply a lot of reliable and economical means that of biometric authentication. Human identification at a distance has recently gained huge interest among laptop vision researchers. Gait recognition aims primarily to handle this drawback by recognising individuals supported the method they walk. during this paper, we have a tendency to propose associate economical self-similarity primarily based gait recognition system for human identification victimization changed freelance element Analysis (MICA). ab initio the background modelling is completed from a video sequence. later on, the moving foreground objects within the individual image frames ar metameric victimization the background subtraction algorithmic rule. Then, the morphological skeleton operator is employed to trace the moving silhouettes of a walking figure.. The planned system is evaluated victimization gait databases and therefore the experimentation on out of doors video sequences demonstrates that the planned algorithmic rule achieves a delightful recognition performance [8].

In this paper utility of your time series primarily based motor vehicle Regressive (AR) modelling technique has been explored for identification of someone. For this purpose, statistic is obtained from the contour coordinates of the ear. AR model is fitted to the present statistic. AR coefficients therefore obtained function a feature vector. Recognition Rate (RR) has been found by a classifier that's supported euclidean distance between feature vector of check samples with coaching samples among itself (intraclass) and with relevance others (interclass). Model has been found invariant to posture, rotation and illumination [9]

Gait recognition is that the method of characteristic a personal by the means within which they walk. this can be a less unassertive biometric, that offers the chance to spot folks at a distance, with none interaction or co-operation from the subject; this can be the property that makes it therefore engaging as a way of identification. This project aims to develop a system capable of automatic gait recognition. A person's gait signature is made employing a model primarily based approach. Temporal and spatial metrics extracted from the modal, like length of body, shin and variation in angles of the limb or the amplitude of a person's walking pattern will all be accustomed produce a "gait signature" of the individual that area unit remodeled into a self similarity matrix [10].

.Human identification at a distance has recently gained growing interest from laptop vision researchers. This paper aims to propose a visible recognition rule primarily based upon fusion of static and dynamic body bioscience. for every sequence involving a walking figure, create changes of the metameric moving silhouettes ar diagrammatic as associate associated sequence of complicated vector configurations, and ar then analyzed mistreatment the each static and dynamic cues ar severally used for recognition mistreatment the closest good example classifier. they're conjointly effectively united on call level mistreatment totally different combination rules to boost the performance of each identification and verification. Experimental results on a dataset together with twenty subjects demonstrate the validity of the planned rule [11]

III. OBJECTIVES

Gait recognition aims to identify people by the way they walk. Several Parameters has been proposed for Gait Recognition previously but there have been always need for better parameters to improve recognition. The existing Gait Recognition Technique doesn't consider the proper movements. The existing Correct Classification Rate is poor. The existing techniques not provide the accuracy and doesn't recognize the gestures, movements and not provide better training.

The appropriateness of the coming results must be accurate and should provide the better results. Efficient Training and Testing takes the benefit for provide the algorithm. Determine and understand the Existing Gait Techniques. And then appropriate analysis is done in accordance to the existing techniques.

1. Find out the drawbacks and issues in the traditional existing techniques.
2. Collection of all the available Human Movement statistics and data.
3. Research on Performance Parameters which leads to accuracy.
4. Identify the improvement Factor and apply the performance factor.
5. Implement Methods on Real Time Footprints of Data in MATLAB Simulation Tool.
6. Determine the results and graphical representation of the results
7. Indentify Images using Noise Filtration Techniques.

IV. PROPOSED METHODOLOGY

The methodology is the process to implement the task and steps in proper order to achieve the accuracy and will be identify the parameters to justify the algorithm in proper system.

1. Initialize the Dataset of Human Gestures.
2. Features Extraction of Input Images Dataset and Query Images.

3. Map the Values based on the Vertical and Horizontal Based Features.
4. Features mapping of the Images Dataset for analyze the Gestures.
5. Analyze the location of Moving Human Images and generate the Boundaries of Images.

V. RESULTS

The image analysis base on the parameters is the crucial task for actual results. Initially, the algorithm need to initialize the Dataset contains the complete dataset of images and need to input query images based on which the algorithm will work. The feature extraction technique has been followed and features have been calculated of different images.

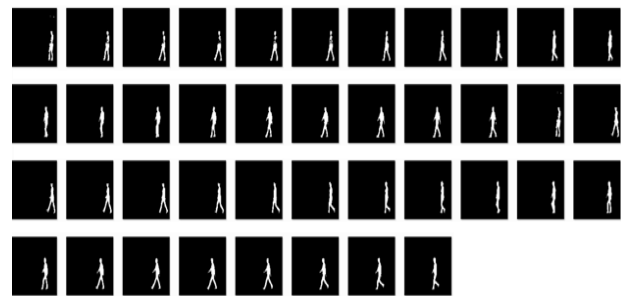Dataset Initialization:

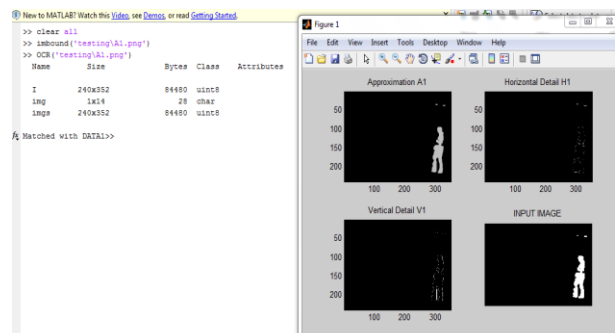Figure 9: Dataset

Figure 10: Motion Detection
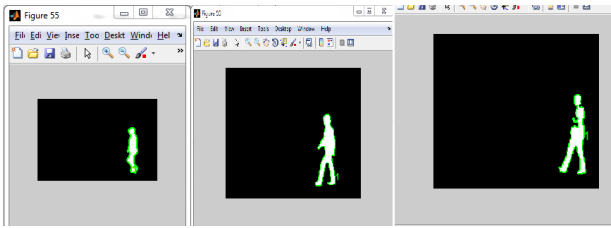

Figure 11: Parameters Based Experiments

Figure 12: Training Images Movements

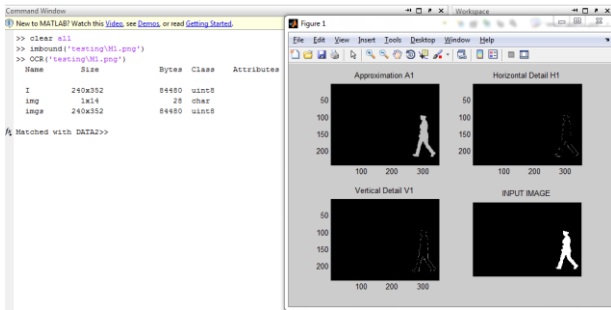Figure 13: Example of Detection

VI. CONCLUSION AND FUTURE WORK

The Gesture Based Motion Detection and GAIT Terminology widely used in the many applications such as detection and analyze the human body movements, security purposes. The Training has been provided to the algorithm and Features Mapping concept has been used. The noise filtration concept has been used for filter the input images noise for accuracy and then, the motion in images has been detected and outlined the image with coloring. Then the vertical, horizontal based values have been plotted of the images for process and detect the image from the collection of dataset. The proposed work shows the accuracy as per recognizing of the images.

In Future, the algorithm can be implementing by using the Fuzzy Inference system in which the multiple rules can be combined to maintain the accuracy on large databases. The Fuzzy inference system is the powerful technique for generate and maintain the rules.

REFERNCES

[1] Arun Joshi, Mr. Shashi Bhushan, Ms. Jaspreet Kaur" GAIT RECOGNITION OF HUMAN USING SVM AND BPNN CLASSIFIERS", International Journal of Computer Science and Mobile Computing, 2014

[2] Chiraz Ben Abdelkader "GAIT AS A BIOMETRIC FOR PERSON IDENTIFICATION IN VIDEO" 2002

[3] Muhammad Muaaz"Inuence of Walking Surfaces and Speeds on Accelerometer-Based Gait Recognition", 2011

[4] Supreet Kaur and Er. Shikha Chawla"An Approach for Enhancing the Human Identification Using Gait Recognition techniques ", International Journal of Application or Innovation in Engineering & Management (IJAIEM)" 2013

[5]. Ayatullah Faruk Mollah, Nabamita Majumder, Subhadip Basu ,Mita Nasipuri " Design of an Optical Character Recognition System for Camerabased Handheld Devices", IJCSI International Journal of Computer Science Issues, 2011

[6] Michael Fitzgerald Nowlan" Human Identification via Gait Recognition Using Accelerometer Gyro Forces, 2009

[7] Cameron Stearns" A System for Cell Phone Anti-theft Through Gait Recognition", 2014.

[8] M. Pushpa Rani and G.Arumugam" An Efficient Gait Recognition System for Human Identification Using Modified ICA", International Journal of Computer Science and Information Technology, 2010

[9] Farida Khursheed and A.H. Mir "AR Model Based Human Identification using Ear Biometrics", International Journal of Signal Processing, Image Processing and Pattern Recognition, 2014

[10] Claudia Nickel" Accelerometer-based Biometric Gait Recognition for Authentication on Smartphones", 2012

[11] Alese, B. K., Mogaji, S. A., Adewale, O. S. and Daramola, O. "Design and Implementation of Gait Recognition System", International Journal of Engineering and Technology, 2012

[12] Liang Wang, Huazhong Ning, Tieniu Tan, Weiming Hu "Fusion of Static and Dynamic Body Biometrics for Gait Recognition", IEEE, 2003