



Person Tracking Using Gait

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Abstract: Gait recognition is one kind of biometric technology that can be used to monitor people without their cooperation. Controlled environments such as banks, military installations and even airports need to be able to quickly detect threats and provide differing levels of access to different user groups. Gait shows a particular way or manner of moving on foot and gait recognition is the process of identifying an individual by the manner in which they walk. Gait is less unobtrusive biometric, which offers the possibility to identify people at a distance, without any interaction or co-operation from the subject; this is the property which makes it so attractive. This paper proposed new method for gait recognition. . In this thesis I will present the review of gait recognition system, different approaches and classification categories of Gait recognition like model free and model based approach, MDA, ENN, NN.

Keywords: Multiple Discriminant Analysis (MDA), Neural Network (NN), Linear Discriminant Analysis(LDA), Back Propagation Neural Network(BPNN), Feature Extraction, Background Subtraction.

I. Introduction

Traditionally password were set as a string which included integer or special characters and were used for authentication and these password can easily cracked but now Biometric authentications are used. Biometric is a field of technology that uses automated methods for identifying and verifying a person based on physiological and behavioral traits [1]. In real time applications like in banks, airports authentications and verifications are always required. In such type of applications biometric identification methods are used. Every individual has different features therefore biometric means unique feature of a person. Biometric characteristics are of two types physiological and behavioral. Physiological characteristics are face, fingerprints, iris, palm print, DNA etc and behavioral characteristics are voice and gait. As these physiological characteristics does not provide good results in low resolution and need user cooperation therefore recognition using Gait is more attractive. Recognition using gait means to identify a person by the way he move or walk. Gait recognition can also used for low resolution images.

A. Gait recognition system

System will identify unauthorized individual and compare his gait with stored sequences and recognize him. Background subtraction is the common approach of gait recognition. Background subtraction method [2] is used to subtract moving objects and to obtain binary silhouette. Using background subtraction, preprocessing is done to reduce noise. Background subtraction techniques are also classified into two types: non- recursive methods and recursive methods. Non recursive techniques use sliding window approach for background subtraction. Recursive methods use single Gaussian method and Gaussian mixture model. Gait recognition method contains two parts 1) training part 2) testing part.

B. Feature Extraction

Feature extraction is an important step in gait recognition. Features are the best function to differentiate between objects from each other. Feature vector is one method to represent feature of image or a part of an image by carrying out measurements on set of features [4]. As silhouette images capture almost the motion of entire body so they are the best features. Two basic feature extraction techniques are classified as 1.Model-based approaches

2. Holistic approaches

Model Based Approach

Model-based approaches employ models whose parameters are determined by processing of gait sequences (binary silhouettes). These methods are scale, view invariant and requires good quality video sequences. In these methods, parameters used as features are the height, the distance between head and pelvis, the maximum distance between pelvis and feet and the distance between feet. In [1], the silhouette of a walking person is divided in to some regions (generally seven regions). Subsequently, ellipses or rectangles are fit to each region and region feature vectors are determined.

This includes averages of the centroid and the aspect ratio. Model based approach is difficult to follow in low resolution images also they have high computational complexity. Advantage of this approach is the ability to derive gait signature from model parameter and free from the effect of different clothing [4]. Features used in this approach are

insensitive to background cluttering and noise [2]. Model based gait recognition system includes motion of thigh and lower leg rotation that describes both walking and running . Parameters used in this approach are height, distance between head and pelvis.

Holistic approaches

Holistic methods operate directly on binary silhouettes without assuming any specific model for the walking human. The contour of the silhouette is the most reasonable feature in this method. For high quality binary silhouettes, width of outer contour of the silhouette was proposed as a suitable feature. For low quality binary silhouettes, the binarized silhouette may be used as a feature.

Model free approach

Model free approach is easy to follow and has less computational complexity and this approach is best suited for real time systems. [8] They used model free approach for gait recognition based on outermost contour.

II. ALGORITHMS USED

1. MDA (Multiple Discriminant analysis)

MDA [13] is used to solve multiple class classification problem. MDA has ability to optimize the class separability. Main objective of MDA is to maximize distance between different classes and minimize difference between each class. [8] They proposed that after MDA training process, gait features are transformed to new space where it becomes easier to classify gait features from different classes.

2. NN (NEURAL NETWORK)

Neural networks are composed of simple elements operating in parallel. These elements are inspired by biological nervous systems. As in nature, the connections between elements largely determine the network function. You can train a neural network to perform a particular function by adjusting the values of the connections (weights) between elements. Typically, neural networks are adjusted, or trained, so that a particular input leads to a specific target output. There, the network is adjusted, based on a comparison of the output and the target, until the network output matches the target. Typically, many such input/target pairs are needed to train a network. Neural networks have been trained to perform complex functions in various fields, including pattern recognition, identification, classification, and speech, vision, and control systems. Neural networks can also be trained to solve problems that are difficult for conventional computers or human beings. The toolbox emphasizes the use of neural network paradigms that build up to—or are themselves used in—engineering, financial, and other practical applications.

3. BPNN(BACK PROPAGATION NEURAL NETWORK)

Most people would consider the Back Propagation network to be the quintessential Neural Network. Actually, Back Propagation is the training or learning algorithm rather than the network itself. The network used is generally of the simple type and in the examples up until now. These are called Feed-Forward Networks or occasionally Multi-Layer Perceptrons (MLPs).

The network operates in exactly the same way as the others. Now, let's consider what Back Propagation is and how to use it. A Back Propagation network learns by example. You give the algorithm examples of what you want the network to do and it changes the network's weights so that, when training is finished, it will give you the required output for a particular input. Back Propagation networks are ideal for simple Pattern Recognition and Mapping Tasks.

4. LDA(LINEAR DISCRIMINANT ANALYSIS)

STEP 1. First we Determine size of input data

STEP 2. Then Discover and count unique class labels

STEP 3. Initialize Group counts , Group sample means , Pooled covariance, model coefficients.

STEP 4. Loop over classes to perform intermediate calculations.

STEP5. Establish location and size of each class.

STEP6. Calculate group mean vectors.

STEP7. Accumulate pooled covariance information.

STEP8. Assign prior probabilities.

STEP9. Use the user-supplied priors.

STEP10. Use the sample probabilities.

STEP11. Loop over classes to calculate linear discriminant coefficients.

STEP12. Intermediate calculation for efficiency.

III. Literature Review

M.Pushparani & D.Sasikala[1] In this paper, the gait recognition approaches such as “Wavelet Descriptor with ICA”, and “Hough transform with PCA” are compared and discussed.

ChewYean Yam, Mark S. Nixon, John N. Carter[2], In this paper, the possibility of recognising people by the way they run remains largely unexplored. The new analytical model presented in this paper is based on the biomechanics of walking and running, and will serve as the foundation of an automatic person recognition system that is invariant to these distinct gaits.

Jyoti Bharti, M. K. Gupta[3], This paper introduces a new gait recognition approach using geometric characteristic and fuzzy logic. Proposed a gait system with the help of fuzzy inference system (FIS) for better gait recognition rate. This approach is tested on a database of video sequences, corresponding 17 people. The previous approaches of gait recognition are compared with our proposed method. We get better recognition rate as compared to previous methods. We have taken two component of human body. The first component is hand and second component is feet.

Shalini Agarwal, Shaili Mishra[4], This paper deals with the problem of detecting and tracking multiple moving people in a static background. Detection of foreground object is done by background subtraction. Tracking multiple humans in complex situations is challenging. The difficulties are tackled with appropriate knowledge in the form of various models in our approach.

M. Pushpa Rani and G.Arumugam[5], In this paper, they propose an efficient self-similarity based gait recognition system for human identification using modified Independent Component Analysis (MICA). Initially the background modelling is done from a video sequence. The proposed system is evaluated using gait databases and the experimentation on outdoor video sequences demonstrates that the proposed algorithm achieves a pleasing recognition performance.

Alese, B. K., Mogaji, S. A., Adewale, O. S. and Daramola, O[7]. This project aims to develop a system capable of automatic gait recognition. A person's gait signature is created using a model based approach. Temporal and spatial metrics extracted from the modal, such as length of torso, shin and variation in angles of the limb or the amplitude of a person's walking pattern can all be used to create a "gait signature" of the individual which are transformed into a self similarity matrix.

IV. PLANNING OF WORK

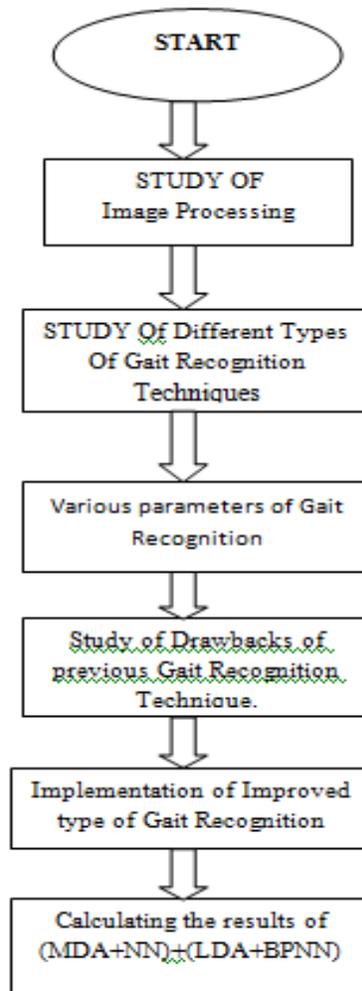


FIG 1:Flowchart

V. Conclusion

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. Enhanced Gait Recognition Technique assures quality of result as it considers more parameters than previously considered like distance between hands enhanced (MDA+NN)+(LDA+BPNN).

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