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GAIT RECOGNITION USING THE METHOD OF 2-DPCA FEATURE EXTRACTION

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ABSTRACT

Gait recognition is the main field of authentication system to identifying the person. Different person utilize different gait step on different situation depending on movements. Gate reorganization is done by using image silhouette, by subtracting background from an image & formation of different gait cycle from different frames. In this various approaches has been utilized for the process of gait reorganization. These approaches utilized feature extraction from silhouette Image's. On the basis of energy and enthalpy level available in different images. But energy and enthalpy does not provide accurate information about gait. To remove these issue in the field of gait reorganization process the approach has to utilize which extract optimal feature for gait reorganization process and give better results.

KEYWORDS: Gait Cycle, Gait Reorganization, feature extraction.

INTRODUCTION

Gait recognition is the identification process for identifying the person walk. Gait recognition is an emerging biometric technology which involves people being identified purely through the analysis of the way they walk each step. While research is still underway, it has attracted interest as a method of identification because it is non-invasive and does not require the subject's cooperation. Gait recognition could also be used from a distance, making it well-suited to identifying perpetrators at a crime scene. But gait recognition technology is not limited to security applications – researchers also envision medical applications for the technology.

Types of Gait Reorganization

Automatic analysis of video imagery- This is the more widely studied and attempted of the two. Video samples of the subject's walk are taken and the trajectories of the joints and angles over time are analyzed. A mathematical model of the motion is created, and is subsequently compared against any other samples in order to determine their identity.

Radar system –This is used by police officers to identify speeding cars. The radar records the *gait cycle* that the various body parts of the subject create as he or she walks. This data is then compared to other samples to identify them.

Gait Cycle

A Gait Cycle is the sequence of events or movements during locomotion in which one foot contacts the ground to when that same foot again contacts the ground. A single gait cycle is also known as a stride cycle.

Components of Gait Cycle

Stance Phase: In stance phase foot remains in contact with the ground. For analyzing gait cycle one foot is taken as reference and the movements of the reference foot are studied. It constitutes of 60 percent of the gait cycle. In stance phase the reference foot undergoes five movements:

1. Initial Contact : The heel is the first bone of the reference foot to touch the ground.
2. Loading Response: Weight is transferred onto the referenced leg. It is important for weight-bearing, shock-absorption and forward progression.
3. Mid Stance: It involves alignment and balancing of body weight on the reference foot.
4. Terminal Stance: Heel of reference foot rises while the toe is still in contact with the ground.
5. Toe Off : Toe of reference foot rises and swings in air. This is the beginning of the swing phase of the gait cycle.

Swing Phase: In swing phase is that part of the gait cycle during which the reference foot is not in contact with the ground and swings in the air. It constitutes about 40% of gait cycle.

LITERATURE SURVEY

Che-Chang Yang et al [1] "Real-time gait cycle parameters recognition using a wearable motion detector" This paper presents the use of an accelerometer-based wearable motion detector for real-time recognizing gait cycle parameters of Parkinson's disease (PD) patients. The wearable motion detector uses a tri-axial accelerometer to measure trunk accelerations during walking. By using the autocorrelation procedure, several gait cycle parameters including cadence, gait regularity, and symmetry can be derived in real-time from the measured trunk acceleration data. The gait cycle parameters derived from 5 elder PD patients and 5 young healthy subjects are also compared. The measures of the gait cycle parameters between the PD patients and the healthy subjects are distinct and therefore can be quantified and distinguished, which indicates that detection of abnormal gaits of PD patients in real-time is also possible. The wearable motion detector developed in this paper is a practical system that enables quantitative and objective mobility assessment.

Huifeng Zhang et al [2] "Research on healthy subject gait cycle phase at different walking speeds" In this paper, the gait cycle phase was divided into six parts based on clinical manifestations of common abnormal gait. According to the sole's position and orientation during a gait cycle, flexion and extension angles of the sole were defined. The healthy subjects' gait parameters data under different gait speeds were captured through motion capture system. The experimental results showed that, in order to adapt to different walking speeds, human gait cycle and other characteristic parameters were adjusted. The reason why the stance time changed was pointed out.

Jianning Wu et al [3] "A new intelligent model for automated assessment of elder gait changes" This paper addressed a novel intelligent model for automatic evaluation of the change of elder gait function based on kinematic gait data. In order to recognize the change of elderly gait patterns with higher accuracy, the wavelet analysis technique was proposed as a new approach to extract gait features, and then those obtained gait features were initiated the training set of gait classifier such as artificial neural network . The gait data of two groups including young and old subjects were acquired during normal walking, and were analyzed using the proposed method and system.

J.P. Singh et al [4] "Person identification based on gait using dynamic body parameters" Gait as a behavioural biometrics has been the subject of recent investigations. One of the advantages of human gait is it can be perceived from a distance. A varied range of research has been undertaken within the field of gait recognition. A gait describes the manner of a person's walking. It can be acquired at a distance and if necessary without consent or knowledge of the subject. Human gait representation can be roughly divided into two categories. One is model-based gait approach and other is model free gait approach. A human body feature that contributes more to an automatic gait classification is subdivided into two i.e. static or dynamic. In our proposed research work, we have considered two features of human body i.e. hand and feet for gait recognition. Second feature feet are subdivided into two i.e. toe and heel of the feet.

Tilton, A.K.et. Al [5] "Filtering with rhythms: Application to estimation of gait cycle" he aim of this paper is to describe a coupled oscillator model for Bayesian inference. The coupled oscillator model comprises of a large number of oscillators with mean-field coupling. The collective dynamics of the oscillators are used to solve an inference problem: the empirical distribution of the population encodes a `belief state that is continuously updated based on noisy measurements. In effect, the coupled oscillator model works as a particle filter. The framework is described here with the aid of a model problem involving estimation of a walking gait cycle. For this problem, the coupled oscillator particle filter is developed, and demonstrated on experimental data taken from an Ankle-foot Orthotic device.

Shirke, S. et al [6] "Model Free Human Gait Recognition" Human walk recognition is a detachment based second period biometrics, which is unpretentious. Human step recognition is just recognizing a person from its walking style. Human Cooperation is not required in this biometric system. There are two philosophies of step recognition, which are model based and model free approaches. This paper gives a late careful diagram of simply model free walk recognition approach. This audit focuses on development free walk picture representation, dimensionality decline of differentiated trick and gathering. Straightforwardly available step dataset are also discussed. The paper is done up by posting the examination challenges and by giving future bearing in model free walk recognition.

APPROACHES USED

PCA

Foremost Component Analysis is used to abatement the dimensionality of the data. The goal of PCA is to diminishing the dimensionality of the data while holding however much as could sensibly be anticipated from the mixture show in the first dataset. It is used to resize the distinctive sizes of pictures into same size.

ICA

The programmed Gait recognition has been satisfied in light of wavelet descriptors and free part examination with the finished objective of human ID at a detachment. The establishment extraction system is associated with subtract the moving human figures definitely and to gain matched diagrams.

SVM

The SVM classifier is used as a piece of bioinformatics on account of its exceedingly exact, prepared to determine and methodology the high-dimensional data, for instance, quality articulation and edibility in showing different wellsprings of data. SVMs fit in with the general arrangement of bit procedures.

RESULT AND DISCUSSION

Gait recognition is a part biometric authentication system that use for the process of various authentication purposes. In the process of gait recognition different gait samples have been used for recognition the system. In the purposed work CASIA-database has been used for gait recognition. In this process different gait images have been used for gait recognition process. In this database different samples have been acquired from different persons at various angles. This database contains the gait samples at 0º, 45º and 90º.

Fig 5.1 Gait Cycle at 0º angle

This figure represents gait cycle at 0º angle. The gait cycle changes due to variation in the angle. The variation in the angle can change the feature value for the gait cycle.

Fig 5.2 Gait Cycle at 45º angle

This figure represents gait cycle at 45º angle. As the variation in angle of capturing gait varies the style of a gait varies .The variation in the feature values can affect the accuracy for gait recognition.

Fig 5.3 Gait Cycle at 90º angle

CONCLUSION

To study various approach for gait reorganization for identification purposes first of all gait image in to S format by subtracting background. Then implement 2DPCA for feature extraction & SVM classifier for reorganization process. We got various types of parameters i.e. FAR & FRR. On the basis of these parameters we conclude that our system gives us better results.

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