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GAIT RECOGNITION FOR SECURITY AND SURVEILLANCE

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I. ABSTRACT

Security And Surveillance Has Nowadays Become A Major Concern With Growing Population. Various Biometric Parameter Can Be Used For Security Purposes Such As Iris Recognition Facial Recognition And Speech Pattern. Gait Recognition Is Also A Type Of Biometric Parameter Which Is Used To Monitor The Walking Pattern of An Human Being. Firstly Binary Silhouette Of A Walking Person Is Detected From Each Frame. Secondly, Feature From Each Frame Is Extracted Using Image Processing Operation. Here Center of Mass and Cycle Length Are Talking As Key Feature

II.INTRODUCTION

Recognition of an individual is an important task to identify people. Identification through biometric is a better way because it associate with individual not with information passing from one place to another. Biometrics is a physiological or behavioral characteristic, which can be used to identify and verify the identity of an individual. There are numerous biometric measures which can be used to help derive an individual identity. They are physiological, like fingerprints, face recognition, iris-scans and hand scans and behavioral, like keystroke-scan and speech patterns. Gait recognition is relatively new biometric identification technology which aims to identify people at a distance by the way they walk. It has the advantage of being unobtrusive, difficult to conceal, noninvasive and effective from a distance

III. EXISTING MODEL

In [1], the literature describes the general method and development actuality of gait recognition, they describe three methods of gait recognition, which include statistical based method, model based method and fusion based method. The statistical based method characterizes body movement by the statistic of the space temporal pattern generated in the image sequence by the locomotive person. The advantages of this method are low computational cost and less time consuming. Model based method constructs human model to recover explicit features describing gait dynamics such as stride dimensions and the kinematics, of joint angle. The advantage of this method is the ability to drive gait signature from model parameter and free from the effect of the different clothing and view point. However, it is time consuming and costly [5]. Fusion is combination of both statistical and model based method. In the previous work many method has been proposed for solving gait analysis. Which include analysis of subject trajectory, velocity movements, discrete symmetric operator, continuous HIDDEN MARKOV MODEL [2] and some other approach based on kinematics and dynamics

model. Han and Bhanu [3] use gait energy image for gait analysis. They used statistical feature extraction approach for learning Effective feature and feature fusion strategy is used to improve recognition. In [4], Eigen space transformation based on Principal Component Analysis (PCA) is applied to reduce the dimensionality of the input feature space. Then supervised pattern classification techniques are finally performed in the lower-dimensional Eigen space for recognition. Su and Zanga

[5] use fuzzy principal component for recognition. Firstly they processed the original gait sequence and gait energy image is obtained then Eigen value and Eigen vector are extracted by fuzzy principal component analysis, which are called fuzzy logic. Finally NN classier is utilized in feature classification. In [6], proposed low resolution method used manifold sampling, back projection and multi linear tensor based learning without tuning parameter. Davrondzhon proposed important gait recognition using cycle matching in which they use wearable accelerometer, to record ankle motion for measuring cycle [7]. In order for the biometrics to be ultra-secure and to provide more than average accuracy more than one form of biometrics requires. Hence the need arises for the use of multimodal biometrics. This uses a combination of different biometrics Recognition technologies. Multimodal biometrics technology uses more than one biometric identifier to compare the identity of the person. When designing a multimodal biometrics system, two factors should be considered: (a) the choice of biometric traits; (b) the level at which information should be fused [19]. In this paper special signature like center of mass, cycle length and step size length of individual from each frame are used as feature vector of person that represents pattern in a concise way and that are particularly well suited for recognition of gait. Different group of data is taking as training and testing. Neural network is using as recognition

tool. The rest of the paper is organized as follows. Section II describes the proposed method in which silhouette extraction, feature extraction process is explained. Section III explains the overall gait recognition system. Network structure is explained in section IV. Section V introduces the training and testing procedure. In section VI, experimental result is presented, finally, we conclude in section VII.

IV. PROPOSED MODEL

Biometrics recognition system involves the preprocessing task. In biometric gait recognition system the database to be collected is in video form, so frame of walking person to be created. These frame to be converted into silhouette. Major preprocessing tasks in gait recognition system are silhouette extraction and features extraction. Silhouette from frame can be extracted using the image processing operation.

These processes are described follows:

A. SILHOUETTE EXTRACTION

The motional individual silhouette must be detected before getting the gait feature. Back ground subtraction is the relatively simple and new approach to find silhouette from image**.**

Fig. 1. SILHOUETTE OF HUMAN

In our experiment the camera is assumed to be static and that body in the field of view is not occluded from each frame.

The whole process of silhouette extraction is described as follows:

• To obtain an approximate background from the image sequence of a walking people, first mean image is computed by averaging the gray-level at each pixel over the entire image sequence (in Fig.1 (b)). Let I k (x,y), k=1,2,…. N, represent sequence of N images. Back ground images b(x,y) can be computed by

b (x,y)=MEDIAN(i(x,y))**(1)**

• Moving object is extracted by back ground subtraction.

• Image processing operation likes Erosion, dilation are applied to improve the quality of extracted silhouette, and reduce noise.

B. Feature extraction

Feature is defined as a function of one or more quality of objects that are capable to distinguish object from each other. Our gait image feature vector is comprised of parameters of moment features in image regions containing the walking

person. Gait feature extraction is the very important tasks in human gait recognition. It must be reasonably robust to the varying conditions, and should be capable of the width of the silhouette was changing periodically with the time-lapse. The width of the silhouette will reach a maximum when the two legs are farthest apart (full stride stance) and drop to a minimum when the legs overlap (heels together stance). At the same time, the height of silhouette has slight Change in the procedure. Consequently, we can get the estimation of gait cycle. For calculating step size length and cycle length, we are using boundary box technique. In silhouette boundary box is created, so that cover whole object from outside and its right edge boundary touches the back foot back end and left edge touches the front foot front end [9], this boundary box width recorded as step size length. Describe the quality of individuals. Intuitively, the silhouette appears to be a good feature to utilize since it captures the motion of most of the body parts and also encodes structural as well as transitional information. Particularly, it is independent of the clothing, illumination and textures etc. Since now we have database in silhouette form, silhouette show most of the body part so we can extract feature from this silhouette. Two basic feature extraction techniques are classified as feature based and holistic method [18]. Feature based method select individual features and characterization of geometrical relationship. Holistic method such as principal component, linear discriminant analysis and independent component analysis used appearance information extracted from entire image. Holistic feature extraction methods find feature with reduced dimensionality by projecting and original data onto the basic vectors. These extracted features can improve classification performance by reducing irrelevant feature from the data set. Selection of important features and eliminate irrelevant features play important role in recognition and computation process. A feature vector is one method to represent feature of image, or part of an image (an object), by carrying out measurements on a set of features. The feature vector is an n dimensional vector that contains these measurements. This vector can be used to classify an object or to provide us with condensed higher-level image information. A feature is robust if it will provide consistent results across the entire application domain. The images we analyze are stored in the form of a two-dimensional data array, in which each datum is referred to as a pixel (picture element). We refer an individual pixel located at row i and column j by the notation [8]: B (i, j) = the brightness of the image at the point (i, j) At the time of walking ,the human body center of mass change from instance to instance so we are using center of mass as a feature this center of mass show the brighter weighted average of x and y coordinates pixels in the frame.

Center of mass of the white pixels area for binary images is the same as the center of mass if we consider the intensity at a point as the mass of that point. In binary image we can calculate center of mass coordinate by using following formula**.**

$$\bar{x} = \frac{\sum_{i=0}^{n} \sum_{j=0}^{m} j * B(i,j)}{A}$$

$$y = \frac{\sum_{i=0}^{n} \sum_{j=0}^{m} j * B(i,j)}{A}$$

Another feature of gait is its periodicity [10]. By observing, By observing, the width of the silhouette was changing periodically with the time-lapse. The width of the silhouette will reach a maximum when the two legs are farthest apart (full stride stance) and drop to a minimum when the legs overlap (heels together stance). At the same time, the height of silhouette has slight Change in the procedure. Consequently, we can get the estimation of gait cycle. For calculating step size length and cycle length, we are using boundary box technique. In silhouette boundary box is created, so that cover whole object from outside and its right edge boundary touches the back foot back end and left edge touches the front foot front end [9], this boundary box width recorded as step size length.

V. PROPOSED MODEL BLOCK DIAGRAM

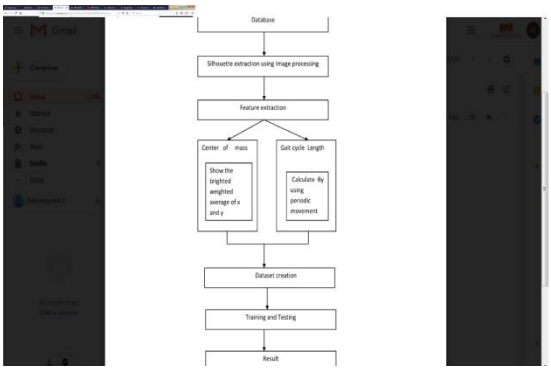

Fig 5.1. Block Diagram

VI.A. CLASSIFIER-LOGISTIC REGRESSION

1. The dependent variable should be dichotomous in nature (e.g., presence vs. absent).
2. There should be no outliers in the data, which can be assessed by converting the continuous predictors to standardized scores, and removing values below -3.29 or greater than 3.29.
3. There should be no high correlations (multicollinearity) among the predictors. This can be assessed by a correlation matrix among the predictors. Tabachnick and Fidell (2013) suggest that as long correlation coefficients among independent variables are less than 0.90 the assumption is met.

At the center of the logistic regression analysis is the task estimating the log odds of an event.
logit(p) for i = 1…n .

Overfitting. When selecting the model for the logistic regression analysis, another important consideration is the model fit. Adding independent variables to a logistic regression model will always increase the amount of variance explained in the log odds (typically expressed as R^2).

However, adding more and more variables to the model can result in overfitting, which reduces the generalizability of the model beyond the data on which the model is fit.

Reporting the R^2. Numerous pseudo-R^2 values have been developed for binary logistic regression. These should be interpreted with extreme caution as they have many computational issues which cause them to be artificially high or low. A better approach is to present any of the goodness of fit tests available; Hosmer-Leme show is a commonly used measure of goodness of fit based on the Chi-square test.

provide excitation field is termed as permanent magnet synchronous generator or also simply called as synchronous generator.

VI.A.i.TRAINING AND TESTING

This paper uses the above ANN architecture, feed forward back propagation learning algorithm to create, train and test the neural network for gait recognition. In addition, MATLAB software with its neural network toolbox is used. The original data sets contains 1250 instance of 25 subjects where each subject has 50 sequence instances. This data is sets group into different data sets as shown in table I. Each set is portioned into two subsets, training set and testing set. In this analysis, the transfer function between input layer and hidden layer is tangent sigmoid function tensing, and one between hidden layer and output layer is linear function

.VIIRESULTS AND CONCLUSION

We performed experiment on CASIA gait database [14]. This database is divided into 3 set, Dataset A, Dataset B (multiview dataset) and Dataset C (infrared dataset). Here we are using data set B. Data set B contain 124 subjects and the gait data was captured in 11 views. In this paper we are taking 25 subject gait database in which view angle is 90°, where people are walking from right to left. Here 50 frame of each subject is taking for training and testing. Experiments performed on Matlab.

DATASET	ACCURACY
1	94
2	94.6
3	96.3

VII . C ONCLUSION AND FUTURE WORK

This paper presents a gait recognition approach using specific features, like center of mass, step size length and cycle length. Here neural network is being used for recognizing people. Our results show that these features are more effective to identify people from distance. Recognition rate for our method is 96.32%. The work can be extended to develop new multimodal biometric [20] system in which, gait can be combined with other biometrics system. So it can be use as one of the good reliable way of authentication.

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