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Role of ANN Classifier to Identify the Person using Gait

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Abstract— To identify the person during their walking is an important task of gait recognition. The process of identifying the person by their gait is an emerging research trend in the field of visual surveillance. Gait is a new biometrics, has been recently used to recognize a person via style of his walking. While walking, all regions of body have different kinds of movements. Proposed method is evaluated on CASIA gait database by using Artificial Neural Network (ANN) classifier. Experimental results showed that proposed method has an encouraging recognition performance also the results shows that the classification ability of ANN with data division technique is better perform than tenfold cross validation method.

Keywords— Gait, biometrics, ANN classifier, CASIA, gait recognition.

I. INTRODUCTION

To identify the person during their walking is difficult task. The process of identifying the person by their gait is an emerging research trends in the field of visual surveillance. Gait is a new biometrics, has been recently used to recognize a person via style of his walking. All parts of body have different movements while walking. To identify the people, biometrics play very important role .The fusion of human gait and biometrics [1] has become a popular research direction over the past few years. It need for automated person identification systems for visual surveillance and monitoring applications in day to day routine activities. It aims to discriminate individuals by the way they walk. In comparison with other biometrics gait has some unique features such as it is unobtrusive in natures. It can be captured at a distance without prior consent of the observed object. Gait also has advantages of being difficult to hide and steal [12]. This paper is organised into five sections: Section I. Introduction Section II. Literature Survey Section III. Proposed Method Sections IV. Experimental Results finally Conclusion and Future Scope are presented in SectionV.

II. LITERATURE REVIEW

Generally gait identification approaches are categorized into two classes namely model based methods and motion based methods. In the model-based methods, the human body silhouette structure or motion is model and then the image features are extracted by the measure of structural components of models or by the motion trajectories of body parts ([2],[3],[4],[5]). Most existing motion-based approaches can be further divided into two main classes, state-space methods and spatiotemporal methods ([6],[7],[8],[9]). In the state-space methods consider gait motion to be composed of a sequence of static body poses, and recognize it by considering temporal variations observations with respect to those static pose. The spatiotemporal method characterizes the spatiotemporal distribution generated during their gait motion. Model based approach it has high computational complexity and more difficult in low resolution images so that it found difficulty in real time system due to feature extraction process. In motion based approach as its computational complexity remains low, this approach is well suitable for real time system as it is easy to extract the features comparatively. [10] presented human ID gait analysis experimented on baseline algorithm method.[6] presented method to recognize the gait of moving person with self similarity plots.

III. PROPOSED METHOD

The proposed system consist of four steps namely, forground subtraction, silhouette segmentation, feature extraction, classification. Initially gait video sequence is captured by using static camera. By using approximate background subtraction method binary silhouette of the moving objects are extracted. By using morphological operation irregularities present in the silhouette are removed. Using segmentation process, silhouette body are divided into six components. From these components, features are extracted by using two dimensional discrete wavelet transform method. By using Artificial Neural Network (ANN) classifier, comparision between train features and test features are computed and achieve better classification accuracy. Proposed method is described in four steps as follows.

Step1: Initially in forground subtraction step, video of the walking object is captured using static camera and its binary silhouette is extracted by using approximate median background subtraction method. In this method frame difference between current frame and known background frame is computed and is compared to predetermined threshold level. If this difference is greater than threshold then it is foreground otherwise it considered as background frame. For this method it is assumed that background is remain static in nature. By using erosion and dilation technique, irregularities become removed.

Step 2: In silhouette segmentation step, we know that while walking the person, variation take place in each parts of the human body. So that binary silhouette body is segmented into six region namely head, torso,right hip, left hip, right leg and left leg region components on the basis of its analytical structure information [11].

Step3: In feature extraction process, we have considered discrete wavelet method to obtain the additional information from raw image by using decomposition technique. In discrete wavelet transform, image become decomposed into low frequency course approximation information and high frequency detail information by using low pass and high pass filter. In single level decomposition on image result in four sub-frequency bands. As level of decomposition increases, approximation image becomes split up into approximation, horizontal details, vertical details, diagonal details accordingly to their decomposition step .Notice that the detail coefficients are small and consist mainly of high-frequency information, while the approximation coefficients contain only the low frequency information. In this step, we have used single level-two dimensional discrete wavelet transform using coiflet4 wavelet family operated on six components of human body silhouette. We have used approximation sub band from which approximate coefficients features are extracted from each of the region.

Step4: In the classification step, we have considered Artificial Neural network classifier (ANN).It is one of the best classifier for pattern recognition. A neural network with enough elements (called neurons) can classify any data with arbitrary accuracy. They are particularly well suited for complex decision boundary problems over many variables. Therefore neural networks are a good candidate for solving the non linear classification problem also. The network will be designed by using the attributes of neighbourhoods to train the network to produce the correct target classes. Once network is ready to be trained, the samples are automatically divided into training, validation and test sets. The training set is used to teach the network. Training continues as long as the network continues improving on the validation set. Performance of this ANN network is depends upon data distribution methods namely, the training, validation and test sets and cross validation method. The trained neural network can now be tested with the testing samples .This will give us a sense of how well the network will do when applied to data from the real world.

IV. EXPERIMENTAL RESULTS

The proposed method is tested on both CASIA A and CASIA B gait database have a frame rate of 29fps and 25fps respectively. For this experiment we have used ten different objects with side view consideration. Each object consists of 35frames with 2.5 gait cycle. In this experiment, single level discrete wavelet transform method is used for feature extraction using approximate sub band. For training and testing the feature vectors ,we have considered two feature vector data distribution method namely tenfold cross validation method and other is data division method .In data distribution method, we have considered 80%,10%,10% as a training data, testing data,validationdata distribution respectively. We have used feed forward back propagation neural network model using Levenberg-Marquardt algorithm .The eighteen features will act as inputs to a neural network and the ten Human objects will be target. So we have designed neural network architecture of 18*20*10 nodes in which the input layer which consists of 18 nodes, hidden layer considered 20 node and output layer consist of 10 nodes.

Table 1 Performance of ANN classifier using tenfold cross validation method for different body regions.

Body region	% Correct classification rate
Head	34.28
Torso	17.14
Lhip	22.85
Rhip	14.28
Lleg	20
Rleg	22.85
All	48.57

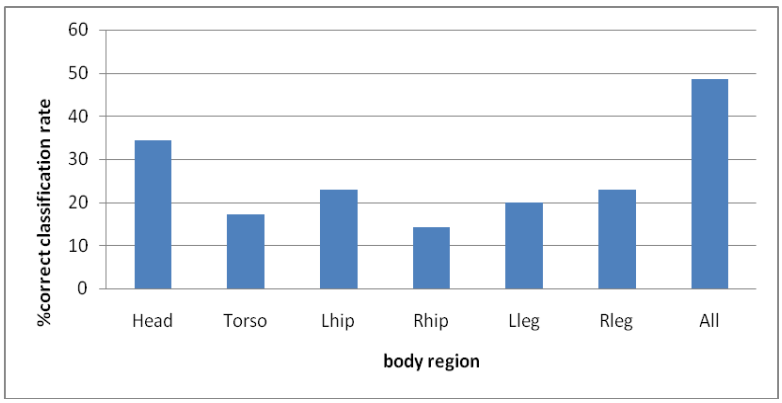

Fig. 1.Performance of ANN classifier using tenfold cross validation method for different body regions.

Table 2 Performance of ANN classifier using data division for body regions.

Body region	% correct classification rate
Head	40.28
Torso	38
Lhip	31.42
Rhip	36
Lleg	32.28
Rleg	33.71
All	79.13

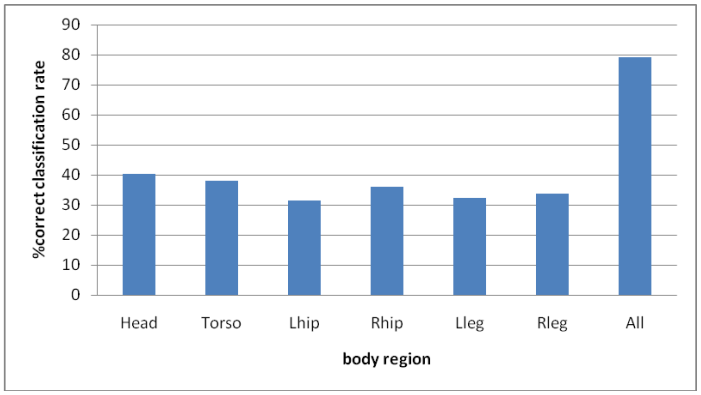

Fig.2. Comparative performance of ANN classifier using data division for body regions.

Table 3 Comparative performance of ANN classifier for different body region using tenfold and data division method

Body region	% Correct classification rate	
	Ten fold cross validation	Data division
Head	34.28	40.28
Torso	17.14	38
Lhip	22.85	31.42
Rhip	14.28	36
Lleg	20	32.28
Rleg	22.85	33.71
All	48.57	79.13

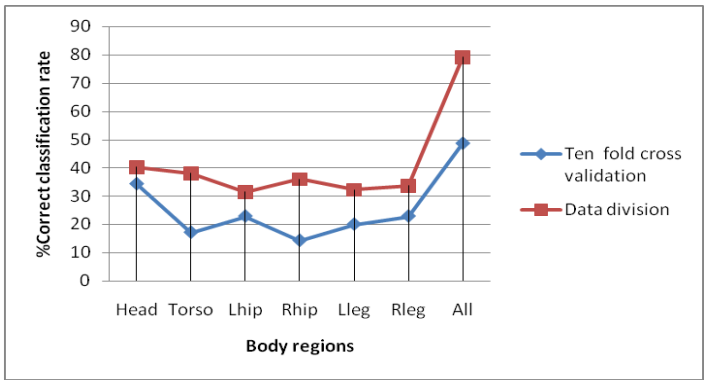

Fig.3. Performance result of ANN classifier on different body region using tenfold and data division method

Table.1 and Fig.1 shows performance result of ANN classifier for on six body region by using tenfold cross validation method whereas Table 2 and Fig.2 shows performance result of ANN classifier for six body region using 80% as a training data,10% as a testing data and10% as a validation data using data division method. By considering their comparison of these two methods as shown in Table 3 and Fig. 3, data division method give better classification result than tenfold cross validation for individual body region. We have considered all six body region instead of individual, we have achieved 79.13% classification rate using data division method.

V. CONCLUSION

The proposed method is tested on CASIA gait database by using ANN classifier and wavelet feature extraction method .We have determined the individual contribution of each segment of human body during their walking .From experimental results, we conclude that data division method give better classification result than tenfold cross validation

for individual body region. By considering all six body region instead of individual, we have achieved 79.13% classification rate using data division method. To improve the performance of the proposed method, work has to done on classifiers.

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REFERENCES

[1] A. Jain,R.Bolle and.S.Pankanti,Bimetrics:Personal Identification in Networked Society, Kluwer Academic pulisher,1997.

[2] R. Collins, R. Gross, and J. Shi,"Silhouette-Based Human Identification from Body Shape and Gait", Proc. Int'l Conf. Automatic Face and Gesture Recognition, pp.366-371,2002.

[3] N. V. Boulgouris, D. Hatzinakos, and K. N. Plataniotis, "Gait recognition: A challenging signal processing technology for biometric identification", IEEE Signal Processing Magazine, Vol.22, No. 6, pp. 78-90,2005.

[4] N. Huazhong, T. Tieniu,W. Liang, and H.Weiming, "Kinematics-based tracking of human walking in monocular video sequences", Image and Vision Computing, pp. 429- 441,2004.

[5] C. Y. Yam, M. S. Nixon, and J. N. Carter, " Gait recognition by walking and running: A model based Approach", Proceedings of 5th Asian Conference on Computer Vision, pp. 1-6,2002.

[6] C. BenAbdelkader, R. Culter, H. Nanda, and L. Davis, "Eigen Gait: Motion-Based Recognition of People Using Image Self-Similarity", Proc. Int'l Conf. Audio- and Video- Based Biometric Person Authentication, pp. 284-294, 2001.

[7] J. Han and B. Bhanu, "Individual recognition using Gait Energy Image", IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 28, No. 2, pp. 316- 322.2006.

[8] Y. Chai, Q. Wang, R. Zhao, and C. Wu, "New automatic gait recognition method based on the perceptual curve", Proceedings of IEEE TENCON 2005, pp.1-5, 2005.

[9] C. P. Shi, H. G. Li, X. Lian, and X. G. Li.,"Multi-resolution local moment feature for gait recognition", Proceedings of the 5th International Conference on Machine Learning and Cybernetics, 3709-3714, 2006

[10] P. Phillips, S. Sarkar, I. Robledo, P. Grother, and K. Bowyer, "Baseline Results for Challenge Problem of Human ID Using Gait Analysis", Proc. Int'l Conf. Automatic Face and Gesture Recognition, pp. 137-142,2002.

[11] Dempster W.T, Gaughran G R L, "Properties of Body Segments based on size and weight", American Journal of Anatomy vol.120, pp.33-54,1967.

[12] L.Wang, T.Tan, H.Ning, W. Hu "Silhouette Analysis-Based Gait recognition for Human Identification", IEEE trans.on Pattern Analysis and Machine Intelligence, Vol. 25, pp.1505-1518, 2003.

