ISSN:0975-9646

Review On: Gait Recognition for Human Identification using NN.

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***Abstract*— Recognition of any individual is a task to identify people. 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 behavioural characteristics of biometric recognition. 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. In this thesis, 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, step size length, and cycle length are talking as key feature. At last NN technique is used for training and testing purpose. Here all experiments are done on gait database and input video.**

Keywords:- **Feature Extraction, Gait Recognition System, NN.**

I. INTRODUCTION

Biometrics is the unique features of a person. Biometric recognition refers to an automatic recognition of individual based on feature vectors derived from their physiological and/or behavioral characteristic. Biometric systems for human identification at a distance have ever been an increasing demand in various significant applications. Recognition/Identification using gait becomes more attractive in such type of situations. Every individual has different features therefore biometric means unique feature of a person. Biometric characterstics are of two types physiological and behavioural. Physiological characteristics are face, fingerprints, iris, palm print, DNA etc. And behavioural characteristics are voice and gait. As these physiological
characterstics 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. The definition of gait is "A particular way or manner of walking on foot". Human gait recognition works from the observation that an individual's walking style is unique and can be used for human identification. Depending on feature extraction, gait recognition methods are classified as appearance-based and model-based gait recognition. The appearance-based approaches suffer from changes in the appearance owing to the change of the viewing or walking directions. Model-based approaches extract the motion of the human body by means of fitting their models to the input images. Model-based methods are view and scale invariant.
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 is used to subtract moving objects and to obtain binary silhouette.

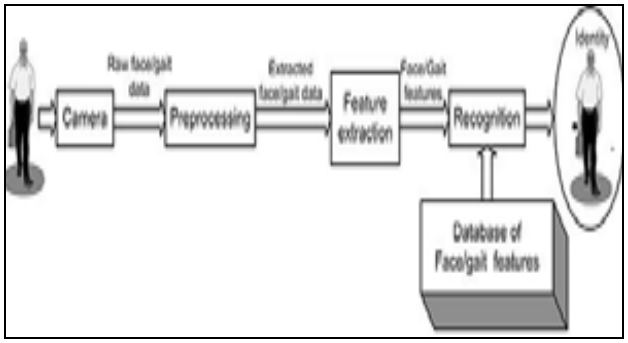

Figure1: The basic Gait Recognition System.

Using background subtraction, pre-processing is done to reduce noise. Background subtraction techniques are also classified into two types: non- recursive methods and recursive methods. Non recursive technique uses sliding window approach for background subtraction. Recursive methods use single Gaussian method and Gaussian mixture model.
Gait recognition method contains two parts
• Training part
• Testing part.
Model based approaches are 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. Features used in this approach are insensitive to background cluttering and noise. Model based gait recognition system includes motion of

thigh and lower leg rotation that describes both walking and running. The use of double pendulum to describe the thigh and lower leg movement. Model based method construct human model to recover features describing gait dynamics such as stride and kinematics of joint angle. Parameters used in this approach are height, distance between head and pelvis.

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

II. SILHOUETTE REPRESENTATION.

An important cue in determining underlying motion of a walking figure is temporal changes of the walker's silhouette. To make the proposed method insensitive to changes of color and texture of clothes, we use only the binary silhouette.

Silhouette analysis based recognition system was proposed. In this, distance signal was the feature vector, which is obtained by calculating distance between each pixel and centroid of the binary silhouette. In this paper, some of these limitations are overcome by taking combined features in the form of width and shape information of the binary silhouette of the person to be identified. First step of the proposed method is the extraction of foreground objects i.e., human and other moving objects are extracted from input video sequences. Gaussian mixture model is used for foreground object estimation in which an additional step of filtering by median filter is incorporated to remove noises. Moving target classification algorithm is used separate human being (i.e., pedestrian) from other foreground objects (viz., vehicles). Shape and boundary information is used for this moving target classification. Width vector of outer contour of binary silhouette and MPEG-7 ART (Angular RadialTransform) coefficients are taken as the feature vector. These extracted feature vectors are used to recognizing individuals. Hidden Maekov Model (HMM) is used for recognizing persons on the basis of gait. Various parameters like distance between hand and distance between leg are calculated .Finally NN and ENN results are calculated which is far better in comparison to previous research paper.

III. RECOGNITION

Once we obtain gait features, the next step is gait recognition. In this section, we introduce Neural Network. We give a brief description of the Neural Network method.

Neural Networks

Artificial neural networks are composed of interconnecting artificial neurons (programming constructs that mimic the properties of biological neurons). Artificial neural networks may either be used to gain an understanding of biological neural networks, or for solving artificial intelligence problems without necessarily creating a model of a real biological system. The real, biological nervous system is highly complex: artificial neural network algorithms attempt to abstract this complexity and focus on what may hypothetically matter most from an information processing point of view.

Neural networks give effective results for solving multiple class classification problems. The neural network facilitate gate recognition because of their highly flexible and non linear modelling ability. Neural network has three types of layers: input layer, output layers and hidden layers. Hidden layer does intermediate computation before directing the input to output layer. Back propagation can also be considered as a generalization of delta rule. When back propagation network is cycled, an input pattern is propagated forward to the output units through the intervening input to hidden and hidden to output weights. Neural network have been widely used in image and signal processing.

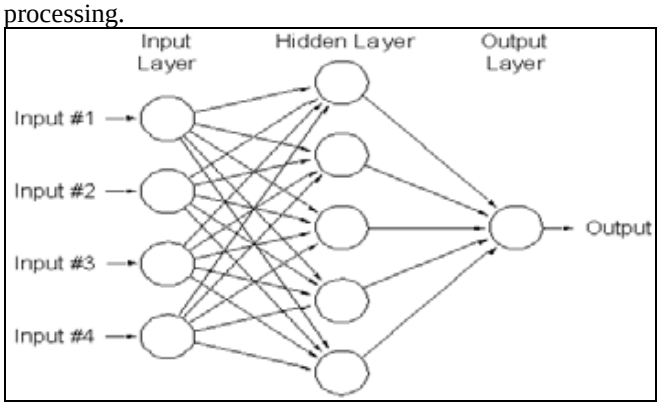

Figure2: Basic layout of the Neural Networks

This class of networks consists of multiple layers of computational units, usually interconnected in a feed-forward way. Each neuron in one layer has directed connections to the neurons of the subsequent layer. In many applications the units of these networks apply a sigmoid function as an activation function. The universal approximation theorem for neural networks states that every continuous function that maps intervals of real numbers to some output interval of real numbers can be approximated arbitrarily closely by a multi-layer perceptron with just one hidden layer. This result holds only for restricted classes of activation functions, e.g. for the sigmoidal functions. Multi-layer networks use a variety of learning techniques, the most popular being back-propagation. Here, the output values are compared with the correct answer to compute the value of some predefined error-function. By various techniques, the error is then fed back through the network. Using this information, the algorithm adjusts the weights of each connection in order to reduce the value of the error function by some small amount. After repeating this process for a sufficiently large number of training cycles, the network will usually converge to some state where the error of the calculations is small. In this case, one would say that the network has *learned* a certain target function. To adjust weights properly, one applies a general method for non-linear optimization that is called gradient descent. For this, the derivative of the error function with respect to the network weights is calculated, and the weights are then changed such that the error decreases (thus going downhill on the surface of the error function). For this reason, back-propagation can only be applied on networks with differentiable activation functions.

IV. CONCLUSION

With the increasing demands of visual surveillance systems, human identification at a distance has recently gained more interest. Gait is a potential behavioral feature and many allied studies have demonstrated that it has a rich potential as a biometric for recognition. This paper has described a simple but effective method for automatic person recognition from body silhouette and gait. The combination of a background subtraction procedure and a simple correspondence method is used to segment and track spatial silhouettes of a walking figure. Gait based recognition has been described in context of person authentication. Several existing techniques for gait recognition have been discussed. Intermediate results describe the effectiveness of proposed system. Results obtained in all intermediate steps have been discussed.

ACKNOWLEDGMENT

Thanks to my Guide and family member who always support, help and guide me during my dissertation. Special thanks to my father who always support my innovative ideas.

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