TEZPUR UNIVERSITY

ABSTRACT

DETECTION, TRACKING AND RECOGNITION OF HUMANUSING GAIT ANALYSIS FOR AUTOMATED VISUAL SURVEILLANCE

By Pranjit Das

Under the supervision of Dr. Sarat Saharia

Gait is a manner of walking and it is used as an important biometric feature. Gait is mostly used for walking people detection and human recognition in videos in many applications, such as traffic monitoring, human motion capture and video surveillance. This work mainly focuses on the detecting, tracking and recognition of human for video surveillance, including people identification. A method is proposed for the detecting, tracking and classifying of the moving object in the input video stream. Moving objects are detected using background subtraction. A specific feature vector is used for tracking which includes features like height and width of bounded box, size and centroid of silhouette of the walking individual. For the identification of walking people, we derived a unique pattern of gait motion from the heel strike pattern. The heel strike pattern is used as the main cue to classify or distinguished human walking subjects from other moving objects like cars, etc. The specific pattern of gait motion is employed as the main discriminative stimulus.

We have also proposed a method for recognition of human by their gait for automated video surveillance. The method includes two stages; in the training stage, the sample video sequences of walking people are stores as training database. Some distinguishable gait features like gait periodicity, Aspect ratio, centroid distance, distance between two successive heel strikes and orientation are extracted from the video sequences of walking people. Then PCA (Principal Component Analysis) is employed over the generated feature vectors and the computed principal component scores are used as signatures of the gait patterns. In the testing stage, new subjects are processed in the same way as in the training stage. The new derived feature vectors are transformed in PCA space and then Cascade SVM (Support Vector Machine) classifier is used to recognize or verify the subject's identity using the generated gait patterns. We have used k-fold cross validation (We have consider the 10-fold cross validation) in order to compute the recognition rate. After conducting all the experiments and the cross validation over 150 videos, we have achieved a recognition rate of 94.66 % from the proposed method.

Key Words: Gait, Silhouette, Biometric Features, Heel Strike, Principal Component Analysis (PCA), Support Vector Machine (SVM).