Abstract

In this thesis issues related to gait representation and recognition are addressed. Some symbolic approaches to gait recognition are proposed. Both silhouette based and texture based methods are explored. Under silhouette based technique, two different methods of extracting features for gait characterization are proposed. In the first method, features are extracted directly from the gait silhouette whereas in the second method, features are extracted based on the axis of least inertia of a gait silhouette. Performance of feature level and score level fusion of silhouette based methods are studied.

The proposed silhouette based feature extraction methods are simple and computationally efficient but they are sensitive to contour deformations and occlusions resulted due to segmentation problems. This limitation has lead to the development of texture based methods for gait characterization. Three different feature extraction methods based on gait image texture are proposed. The first method extract features by applying Radon transform on the change energy image obtained by aggregating the successive gait images across the gait cycle. The second and third method exploits GEI and LBP technique for feature extraction.

In order to capture the variations in gait due to different covariates of a subject, a method of preserving extracted features from all the covariates in the form of interval valued feature vector is proposed for all the methods. Feasibility of existing symbolic similarity measure is studied to compute the degree of similarity between probe and reference gaits, which are described by crisp and interval valued feature vectors, respectively and fuzzy trapezoidal membership function is introduced as a symbolic measure for gait matching. A simple nearest neighbour rule is followed for gait identification (Recognition).

Effectiveness of all the proposed methods are validated thoroughly by conducting extensive experiments on a considerably large benchmark CASIA B and newly created UOM gait datasets. Experimental results have shown encouraging results. Superiority of the proposed methods over some existing contemporary methods are established through
an extensive comparative study on the standard dataset. In brief, this thesis attempts to explore the applicability of interval valued symbolic data for gait representation and identification, through exploration of some novel feature extraction techniques.