# Abstract

Gait, which is defined as the style of walking of a person, has been recognized as a potential biometric feature for identifying human beings. The shape and dynamics of gait of an individual is usually the same for all gait cycles and is considered to be unique to that individual. Extensive work has been carried out to identify and extract gait features that are invariant to viewpoint, walking surface, carrying conditions, etc. However, all of these approaches assume that there is little or no occlusion present at the time of capturing the gait videos, both during training as well as testing and deployment. Current dissertation focuses on this challenging problem of gait recognition in the presence of occlusion.

In this thesis, a new gait recognition method has been proposed which captures minute details of the dynamics and the shape variation of body during walking. Next, a statistical model of occlusion has been introduced for quantifying the level of occlusion in a video. The model can also be used to synthetically introduce occlusion, thus providing a direction for controlled data set generation against which the occlusion handling algorithms can be tested. Then, an approach for detecting the presence of occlusion in a sequence of video frames has been proposed. Clean and unclean gait cycles are segregated as the algorithm output. If all the subsequences of frames corresponding to a gait cycle are degraded by occlusion, none of the existing methods can be used for recognition from this video sequence. The need for reconstruction of the degraded frames to construct clean gait cycles becomes pertinent in such situations. A novel method has been suggested, which is able to reconstruct the missing silhouettes considerably well. These reconstructed silhouettes are then used for recognition by the proposed gait recognition approach. The methodology has been evaluated on both real as well as synthetically occluded video data sets having varying levels of occlusion. Finally, a potential application of gait in person reidentification, which aims to recognize the same person viewed by multiple disjoint cameras at different time instances and locations, is presented.

**Keywords:** *Gait recognition, Occlusion handling, Modeling occlusion, Person reidentification*