ABSTRACT

Face recognition recognizes the face images by extracting the facial features from a test image and compares it with trained facial images. The intensity variations due to illumination, shift, pose, and occlusion in human faces result in a highly complex distribution. Generally, the solution to this drawback is to extract the facial features before discriminant analysis which brings robustness against these variations. In this research work four different face recognition frameworks are developed. In the first step of the research work deals with developing Sparse Representation based Face Recognition Model is presented to handle misalignment and occlusion related problems in face images. The issues of illumination, alignment, pose and occlusion in recognizing face images are crucial when they are dealt simultaneously. Thus, a unified approach for face alignment and recognition in the presence of contiguous occlusion has been achieved. The efficiency of the approach is evaluated with the Yale and UPC face databases.

In the second step of the research work an efficient facial feature representation by using Dual Tree Complex Wavelet Transform (DT-CWT) is proposed. The crucial step in face recognition system is the extraction of facial feature. The Complex WT face characterizes the geometrical structure of facial images by using the properties of DT-CWT such as approximate shift in-variance and good directional selectivity. Since the efficiency retained with DT-CWT is inadequate, a new block design using Dual Tree Complex Wavelet Transform along with efficient normalization and noise reduction techniques is developed. The results are evaluated using FRI CVL face and Yale dataset.

In the third step of the research work the Structure from motion (SfM), based 3D face reconstruction model is discussed. In view of self-occluded 2D face image, this technique is susceptible to point correspondence error reducing its
performance. To eliminate point correspondence error a matrix called shape conversion matrix SCM is appraised to obtain the true location of self-occluded facial feature points FFPs. In the proposed model, a new SfM method called multi-stage linear approach is adopted. A novel face alignment algorithm called RASL is incorporated with the system. A more resourceful feature localization technique called simultaneous inverse compositional algorithm is modified. A generalized polycube trivariant spline-based 3D dense mean model adaptation is integrated. The proposed model is evaluated using FacePix image dataset.

In the final step of the research work deals with Artificial Occlusion (extraneous objects that hinder face recognition, e.g., scarf, glass, beard etc.,) is one of the greatest challenges in face recognition systems. In this work the normalization provides orientation of the image to frontal view since it requires frontal position for face recognition. An efficient method is used for detection of occlusions, which specifies the missing information in the occluded face. The restoration process eliminates occlusion and renders a restored facial image. It exploits the information provided by the non-occluded part of the face to recover the original face. The proposed system will provide better accuracy to eliminate the occlusion and restored facial information is independent of the face recognition method. The proposed model is tested using UMB-DB image dataset.