Abstract

Recognition of faces is a fundamental cognitive ability that forms an important basis for our social interactions. While the task seems to be trivial for human beings, the machine detection and recognition of faces is a challenging research area, due to the concerns of security issues in the contemporary world. The dissertation addresses some of the problems in the area in order to improve upon the existing knowledge. Chapter 1 outlines the motivation and scope of the work along with a brief survey of relevant literatures. In chapter 2, with the help of a modified graph theoretic algorithm, the multivariate histogram is used for clustering pixels and extracting the facial features as major segments. A threshold on dissimilarity value is needed so that a query image is always not classified to one of the existing classes. In chapter 3, a novel thresholding technique for classification using set estimation method is introduced. The theoretical basis have been successfully evolved and verified on still, video and color face datasets. In chapter 4, the set estimation technique is applied for locating the face space boundary for face detection. The proposed method is shown to be more effective for discrimination of face and non-face than the existing techniques based on receiver operating characteristics (ROC). The proposal is tested successfully for detecting the number of faces in an image containing multiple faces. In chapter 5, the set estimation technique is applied for the generation of two dimensional (2D) face images. The synthesis is done on the basis of inheriting features from inter and intra face classes in face space. Face images without artifacts and expressions are transformed to images with artifacts and expressions. The measured performance indices for the generated faces with respect to the training faces reflect the well accepted quality of the generated images. Chapter 6 proposes a 3D-Fourier transform based technique for live/fake face discrimination from video face images. The dissertation is concluded with a note on the future scopes of the work in Chapter 7, relevant appendices and references.