Santosh Yadav Jada

16245773

Face Recognition Machine Vision System Using Eigenfaces

Face recognition is a common problem in machine learning and in this paper, they are using one of the basic face recognition techniques which is eigenface. This paper talks about the experimental performance comparison of face recognition using PCA and normalized PCA. Face recognition system generally has two categories: identification and verification. Here the classification step uses the Euclidean distance classifier. A pattern recognition system is classifying a face either known or unknown after matching it with the stored known individuals in the database. Acquisition Module: The use gives the face image as input to the system. Preprocessing Module: The images are normalized- Image size normalization, background removal, illumination and normalization. Feature Extraction Module: This composes a feature vector to represent the face. Then these features are compared to the ones in the database. Eigen vectors of a linear operator are non-zero vectors, resulting in Eigen value and eigen vectors. The training set of m images of size N\*N are changed into one dimensional vector. Average face image is calculated by mean function also called as mean centered image and then Covariance matrix is calculated. Now eigen vectors corresponding to it could be easily calculated with reduced dimensionality. These eigen vectors represent Eigen faces and are ranked according to their usefulness. In the recognition step, the distance of each face to the obtained vector is calculated using Euclidean distance. A face could be classified as belonging to class k if the distance is minimum by setting a threshold. PCA is a statistical dimensionality reduction method which produces linear least square decomposition of a training set. N-PCA is developed to obtain better results in terms of efficiency. Firstly, normalization of images is done to remove the light variations and SVD is used and lastly in the classification step, weights are calculated. The databases used are ORL face database and IFD for the experiments. All the images in ORL are 8-bit gray scale with size 112\*92 pixels and bright background for the IFD with four emotions of images for every entity. The eigen face approach is fast and simple process for constrained environment. It gives small set of likely matches. This paper talks about N-PCA function improvement over PCA for feature extraction. The accuracy for PCA is 92.5% and 74.17%, while N-PCA is 93.7% and 76.6% on OR: and IFD for 80/20 ratio. This indicates that N-PCA is an effective solution to face recognition problems.