A CLASSIFICATION TECHNIQUE FOR FACE RECOGNITION BASED ON LOCALLY MERGED CODEBOOKS

V. Thileeban

Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka.

Automatic recognition of people is a challenging problem which has received much attention during recent years due to its many applications in different fields such as law enforcement, security applications or video indexing. Face recognition is a very challenging problem and up to date, there is no technique that provides a robust solution to all situations and different applications that face recognition may encounter. Face is the most common biometric used by humans. Face recognition is to recognise a person from a given two dimensional image. Face recognition technology solves this problem since a face is undeniably connected to its owner except in the case of identical twins. Difficulties of face recognition are inter-class similarity and intra-class variability due to head pose, illumination conditions, expressions, facial accessories and aging effects. In face recognition the system compares the given individual with who they say they are and gives a yes or no decision after that the system compares the given individual to all the other individuals in the database. In this work a framework is proposed to classify faces using scale-invariant feature transform (SIFT) and speeded up robust features (SURF) through a novel method which is compared with the bag-of-feature approach. The images of AT&T and Yale faces are classified through the system that involves identification of regions of interest and representation of those regions SIFT or SURF descriptors, construction of codebooks which provides a way to map the descriptors into a fixed-length vector in histogram space, and the multi-class classification of the feature histogram is performed using nearest neighbor method in the case of bag-of-feature approach. In our proposed frame work the extracted descriptors of an image is voted against the locally merged codebooks to predict the subject, without the need for mapping the descriptors into a fixed-length feature vector and then feeding it to a classifier. The AT&T face database contains 400 images for 40 persons with ten images per person. The Yale face database contains 165 images for 15 persons with 11 images per person. The testing results show 70% classification accuracy in the AT&T faces whereas80.1% in Yale faces using SIFT. When using the SURF descriptors, the results show 77% classification accuracy in the AT&T faces whereas 78.9% in Yale faces. Our proposed technique achieved 91% classification rate using SIFT descriptors and 92% using SURF descriptors in AT&T faces. The proposed method not only shows better accuracy in classifying faces of different subjects but also drastically reduces the computational time and storage as that of bag-of-features approach.