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FACE RECOGNITION BASED ON EDGE DETECTION ALGORITHM

Chandreyi Roy[1]
Chandra Sekhar Nandi[2]

[1]Student of Applied Electronics and Instrumentation Engineering Department,
University Institute of Technology, Burdwan University, E-mail:chandreyiroy1991@gmail.com
[2]Faculty of Applied Electronics and Instrumentation Engineering Department, University Institute of Technology, Burdwan University, W.B. India. E-mail csnandi@uit.buruniv.ac.in

ABSTRACT

Automatic face recognition poses to be a challenging problem that is still far from being solved. Now a days, face recognition has become a biometric of choice for many security applications. In this work, a new technique for human face recognition is proposed. This technique uses an image-based approach towards artificial intelligence by removing redundant data from face images through image compression using the two-dimensional discrete cosine transform (2D-DCT). A self-organizing map (SOM) using an unsupervised learning technique is used to classify DCT-based feature vectors into groups to identify if the subject in the input image is "present" or "not present" in the image database. Face recognition with SOM is carried out by classifying intensity values of grayscale pixels into different groups or clusters. Evaluation was performed in MATLAB using an image database of as many as 20 face images. After training the system with a group of 3 facial images for approximately 1000 epochs the system achieved a recognition rate of 99% for 10 consecutive trials.

Index Terms- Face recognition, Edge detection, Discrete cosine transform (DCT), Self-organizing map (SOM), facial images.

INTRODUCTION

In recent years, the study of image analysis and its use in facial recognition applications has drawn significant attention from the worldwide research community. Facial recognition is a popular research area in pattern recognition and computer vision due to its wide range of commercial and law enforcement applications, including passports, credit cards, and drivers' licenses, biometric authentication, video surveillance, and information security. These applications demand user-friendly automatic systems that can secure our assets and protect our privacy without endangering our identity.

The use of facial images as a biometric stems naturally from human perception where everyday interaction is often initiated by the visual recognition of a familiar face. The innate ability of humans to discriminate between faces to an amazing degree causes researchers to strive towards building computer automated facial recognition systems that hope to one day autonomously achieve equal recognition performance [1]. There was an effort to try to measure the importance of certain intuitive features [2] (mouth, eyes, cheeks) and geometric measures (between eye distance [3], width-length ratio). Nowadays it is still a relevant issue, mostly because discarding certain facial features or parts of a face can lead to a better performance [4].

A probabilistic decision-based proof as to why recognition in a statistics-based face recognition system should be based on the pure face portion led to exclusive research in the field of pattern recognition [5]. There are still some human-relevant features that are being taken into account. For example, skin color [6] is an important feature for face detection.

With this background we proposed here a face recognition technique using features derived from DCT coefficients, along with a SOM-based classifier.

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