

FACE RECOGNITION BASED ON DOMINANT FREQUENCY FEATURES AND MULTIREOLUTION METRIC

I GEDE PASEK SUTA WIJAYA, KEIICHI UCHIMURA AND ZHENCHENG HU

Computer Science and Electrical Engineering
Graduate School Science and Technology
Kumamoto University
Kurokami 2-39-1, Kumamoto, Japan
gdepasek@navi.cs.kumamoto-u.ac.jp; { uchimura; hu }@cs.kumamoto-u.ac.jp

Received February 2008; revised July 2008

ABSTRACT. *This paper proposes a new technique of face recognition based on dominant frequency features and multiresolution metric. The dominant frequency features is extracted by selecting a small part of discrete cosine transform coefficients that have large magnitude values and the matching process is performed by multiresolution metric with the smallest score is concluded as the best likeness. There are two main aims of the proposed method; firstly, to create compact and meaningful facial features without removing significant face image information, secondly, to build a simple training process that can solve the retraining problem of PCA based face recognition. The tests are carried out on data from four databases that have different characteristics. The proposed method provides a good performance when it is compared to other established approaches.*

Keywords: : Recognition, Facial features, Matching, Multiresolution, Metric

1. Introduction. The idea of face recognition is inspired by human being ability to recognize object or pattern based on training that has been performed continuously since childhood. Some researchers adopted that process to create any kinds of recognition systems, for instance, recognition system based on geometrical analysis, statistical analysis, neural network, etc [1].

The face recognition is a matching process between a query's facial features and target's facial features. The process becomes difficult to do because the facial features have many similarities in texture, color, shape, and pattern. Furthermore, the variations in a single face can be very large, while the variations between different faces can be quite small. In other side, face information also depends on ethnicity and registration method (i.e., capture methods, lighting conditions, and devices). For instance, the facial features of Chinese people have greatly different from African facial features; frontal face images contain clearer information than that of lateral face images; and face images captured by high-resolution cameras provide better resolution than that of by scanners.

This paper proposes an alternative face recognition system that is based on frequency analysis and multiresolution metric to overcome large computational costs, high memory spaces requirement, and retraining problems of the eigenface method [2,3]. There are two main aims of the proposed method: to create compact and meaningful facial features without removing significant face image information and to build a simple training algorithms that can solve the retraining problem of PCA-based face recognition.

This paper is organized as follows: Section 2 describes the previous work and their weaknesses; Section 3 describes the recognition algorithm of the proposed method, which