A HIERARCHICAL FACE RECOGNITION SCHEME

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ABSTRACT. *Face recognition, a biometric method of identifying individuals using facial features, has attracted increasing interest and research over the last decade. In this paper, we propose a hierarchical scheme for face recognition. The proposed scheme consists of chin outline classification and holistic facial feature identification. Chin-shape information is characterized by chin curvature, the length of the face, and the ratio of face width to face length, all of which are scale-independent. After the holistic facial features were extracted based on Gabor faces, two-dimensional principal component analysis was used to condense the features. A series of experiments was conducted to assess system performance. The results confirm that our system can accurately recognize faces by the hierarchical integration of the feature-based information and the holistic one.*
Keywords: Face recognition, Chin detection, Gabor filter

1. **Introduction.** Face recognition is one biometric method of identifying individuals using facial features. Interest in and research on automatic face recognition have increased significantly over the last decade. This growth is driven primarily by growing application demands, such as security system access, identification for law enforcement, authentication for banking, human-computer interaction, and image or film processing [1,2]. In addition, face recognition does not require the cooperation of the individuals to be recognized. Therefore, face recognition is a powerful tool despite the existence of other biometric recognition approaches such as iris scans and fingerprint analysis [3].

The goal of a face recognition system is to find the best match for a given image captured by a camera. Once a face is detected, the face region must be isolated from the scene to allow recognition. Subsequently, invariant and discriminable features are extracted from the regions of interest (ROIs), and used by the recognition system to assign individuals to a class of facial types. Within the past two decades, numerous face recognition algorithms have been proposed; they generally fall into two categories: feature-based [3,4] and holistic [5-11] methods.

Feature-based methods rely on identifying certain important features on the face, such as the eyes, nose, mouth, etc. Their location determines their geometrical relationships. Hence, each feature is independently processed, and then the results are combined to recognize the face. Holistic methods [5-11] treat the image data simultaneously without identifying each feature. There is no need to explicitly segment facial regions for them to recognize a face as a single entity.

In contrast to feature-based methods, holistic methods have the advantage that they use the face as a whole without destroying any information conveyed in the face. Thus, they generally provide more accurate recognition results. However, most of the existing