

A Content Based Feature Combination Method for Face Recognition

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Abstract:

In the last few years, Content Based Image Retrieval (CBIR) system, where images are searched based on their visual contents instead of annotated texts, has drawn enormous attention of researchers because of its growing demand from real world applications. According to many, biometric traits recognition is one of the most potential applications of CBIR. However, very few works have been published on CBIR based face recognition systems. In this research, a content based face recognition process, where color, texture, and shape features are combined to enhance the retrieval accuracy of the system, is proposed.

Methodology:

Three well known and computationally efficient methods: color histogram [1], Gabor filter [2], and affine moment invariant [3] are used to extract color, texture, and shape features, respectively. Fig. 1 depicts the block diagram of the proposed method. The gray blocks indicate the novel components of the proposed method.

Experimental Results:

Following three databases have been created to evaluate the performance of the proposed method.

- **Grayscale Database:** Contains face images of 20 subjects from AT&T [4] database with variation of pose, expression, rotation, and facial details.
- **Color Database:** Contains images of 20 subjects from AR [5] database with expression variation.
- **Critical Query Database:** Contains critical query images from AR [5] database such as: person wearing sunglasses at different illumination condition and time.

Fig. 2 shows that the proposed method can efficiently recognize face images under varying conditions. Fig. 3 compares the recognition performance of different methods on three databases.

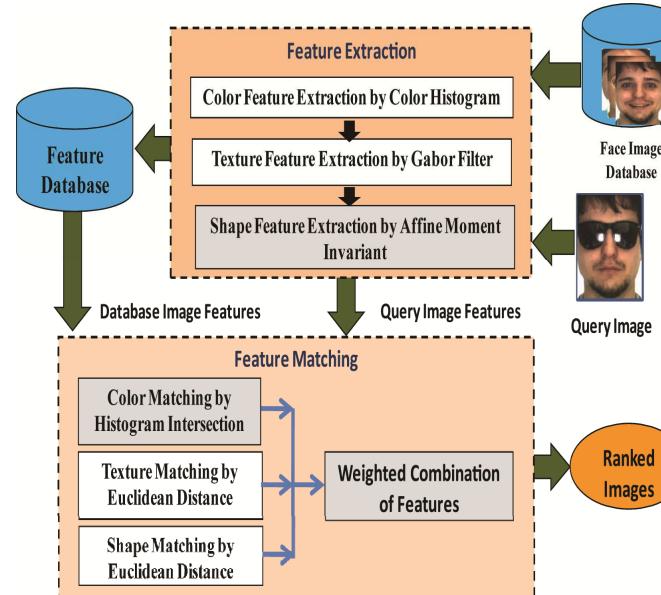


Fig 1: Block diagram of the content base face recognition system.

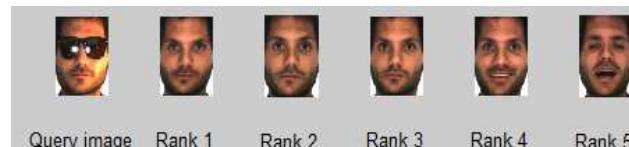


Fig 2: Critical query image (sunglass, varying illumination, and expression) is matched by the proposed method.

Salient Features:

- Fusion of color, texture, and shape features enhanced the recognition accuracy.
- Face images are recognized regardless of rotation, partial occlusion, and illumination change.
- Weight parameters are adjustable according to the performance of each feature.

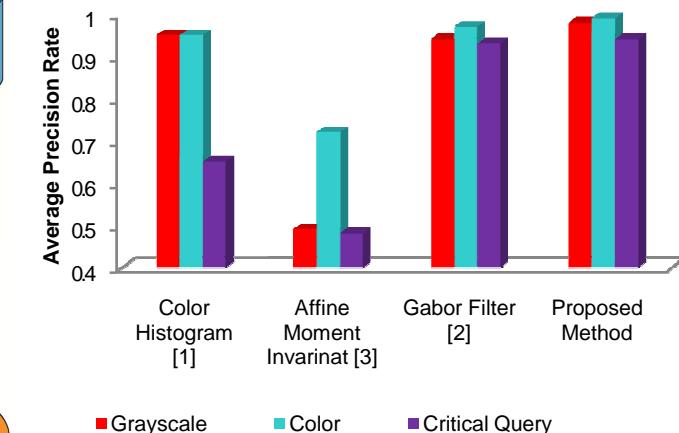


Fig 3: Comparison of average precision rate of different methods for different databases.

Conclusion:

A novel content based face recognition method is proposed. Our feature fusion method has better performance than single feature based methods. This method can be applied to any database effectively because of its high recognition rate, ease of computation, and easy weight adjustment features. Future work includes development of a weight learning system for different features.

Reference:

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