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FACE RECOGNITION ALGORITHM BASED ON PEARSON MIXTURE MODEL USING SUPPORT VECTOR MACHINE

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Abstract

Face recognition algorithms are playing an important role in identification and authentication of persons. In this paper, a novel and new method for face recognition is developed and analyzed. This method is divided into two parts such as detection and recognition. In the first step, features are detected with skin colour using Pearson mixture model and the second step recognition part performed with SVM based classification. Experimental results reveals that this algorithm detect the faces under many complexities such as illumination, background and pose. The efficiency of the developed algorithm is evaluated with JNTUK database and UCD colour face image database.

1. Introduction

The face recognition algorithms are widely used in various applications [9] like video recognition, sketch recognition, marks recognition, aging information etc. The conditions of the face images will vary from time to time. The uncontrolled conditions [1] of the face will be recognized by the individual stable space (ISS). This algorithm completely avoids the view angle information. The eigenfaces will be spanned with feature space and will use the classifies for recognition. For this, feature lines [2] will be extracted

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for the input raw face image and will generalize the feature points of the input image. The face recognition networks based on strongest industry level [3] are found to be efficient for face image recognition. They will give the efficient result by excluding the visual temporal information.

The Linear Disciminant and Principal Component Analysis [4] are found to be efficient for recognition of face images. This method is found to be efficient for enhancing the generalization capability. The head angle mapping [5] is found to be crucial for the efficient face image recognition. It covers the space of pose parameter. The static and dynamic tests [6] are majorly demanded by the face image recognition algorithms. The curvature information and texture information [7] are found to be effective for designing the hybrid grid for the face image recognition. This classifier can be further enhanced with the range information. The binary tree [8] classifier will be used for the classification and recognition of the face images.

The Linear Discriminant Analysis on the Full Space [10] is found to be efficient for recognizing the ear images. It will combine the facial features with the ear features for extracting the efficient results. The response patterns will be represented with multidimensional scaling [11] in spatial domain. It creates a bimodal structure, used for classification and recognition.

The present paper is organized in four sections. The section one gives the introduction, the methodology is proposed in second section, results and discussion in third section and conclusions in fourth section.

II. Methodology

The present paper uses mixture model based on bivariate Pearson type IV_a for the face image recognition. The bivariate Pearson type IV_a is fund to be asymmetric and non negative random variable. It is represented with Equation (1).

$$\sum_{s=1}^{N} t_k(x_s, y_s; \theta^{(l)}) \log (y_s - x_s) - \sum_{s=1}^{N} t_k(x_s, y_s; \theta^{(l)})$$

$$\frac{1}{\Gamma n_k}(\Gamma n^* \log (\log (e)) - \Gamma n^* Psi (n)^* \log (e^{-n}) = 0. \quad (1)$$

The bivariate Pearson type IVa represented face image is further given to the segmentation algorithm which uses the EM algorithm. For this, the entire image is divided into various sub samples and in each sub sample the invariant moments will be estimated. The estimated moments will be further processed to estimate the EM algorithm parameters. The estimated parameters are coupled with the joint probability density function. With the optimal threshold value is used for estimating the segments of the input sub sample. Further the features are classified with the SVM classifier as given in (2).

$$f(x) = \text{sgn}\left(\sum_{SV} y_i a_i K(x_i, x) - b\right) \tag{2}$$

III. Results and Discussions

The efficiency of the proposed algorithm is evaluated with JNTUK and UCD colour face databases. Sample of 5 persons images from JNTUK database is shown in figue-3.

Figure 3. Sample Images from JNTUK Face Database.

Figure 4. Sample Images from UCD Face Image Database.

The results of proposed algorithm are shown in Figure 5.

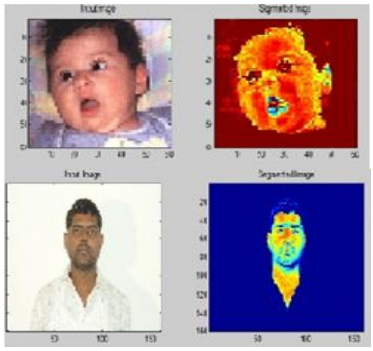

Figure 5. Result of Proposed Algorithm.

The proposed facial recognition algorithm is compared with existing algorithms like PCA, DCT and GMM. Experimental results also reveal that our method performs better than that of existing algorithms. The results are presented in Table 1. From the Table 1. It is found that the performance of the proposed algorithm is efficient when compared with other algorithms.

Table 1. Comparison of Recognition Rate.

Database	Recognition Rate			
	BPIVaMM	GMM	DCT	PCA
JNTUK Database	92±1.5	85±1.6	84±1.2	82±1.6
UCD Face Database	94±1.3	89±1.8	87±1.3	85±1.8

IV. Conclusions

The present paper uses mixture model based on bivariate Pearson type IV_a for the face image recognition. This method overcome the drawbacks associated with the GMM, DCT and PCA models based algorithms. The present paper uses SVM Classifier for further stages. The efficiency of the proposed algorithms is computed with two databases namely UCD Face and JNTUK databases. The results indicate the efficiency of the proposed algorithm.

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