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RESEARCH ARTICLE

A Feature Adaptive Fusion Model for Infant Expression Recognition

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Abstract: Facial Expression recognition is one of complex application of face recognition system. This expression recognition becomes more challenging when the pose and localization of person differ. In case of infant dataset, these all types of complexities exist. In this present work, an adaptive model is defined to identify three different expressions for infant faces. The work is about to identify the infant as well as associated expression. The work is based on the feature adaptive distance analysis model. The feature extraction is here done based on LDA and SURF method. After extracting the features, the distance adaptive mapping is performed to obtain the mapped image and the relative expression. The results show that the work has provided the effective and accurate recognition rate.

Keywords: Infant, Facial, Recognition, Expression, Featured

I. INTRODUCTION

A **facial recognition system** is a computer function designed for identifying or verifying a person from a digital image or a video frame without any human interference.. One of the methods for facial recognition is by comparing choosen facial features from the image and a facial database. Some facial recognition algorithms recognize facial features by finding landmarks, or features, from an image of the subject's face. For example, an algorithm may consider the relative position, size, or the shape of the eyes, nose, cheekbones. These features are then used to look in other images with matching features. Other algorithms normalize a gallery of face images and then compress the face data, by saving only the useful data. An investigate image is then compared with the face data. One of the old successful system is based on template matching techniques functional to a set of significant facial features, providing a sort of compressed face demonstration. Some of the well known face recognition algorithms include principal component analysis using eigenfaces, linear discriminate analysis, elastic bunch graph matching using the fisherface algorithm, the hidden markov model, the multilinear subspace learning using tensor representation, and the neuronal motivated dynamic link matching[1][2][3].

Facial recognition can be used not just to recognize an individual, but also to uncover other personal data related with an individual – such as other photos featuring the individual, blog posts, social networking profiles, internet behavior, travel patterns, etc. – all through facial features alone. Furthermore, individuals have partial ability to keep away from or thwart facial recognition tracking unless they hide their faces. This basically changes the vibrant of day-to-day privacy by enabling any marketer, government agency, or random stranger to secretly gather the identities and related personal information of any individual captured by the facial recognition system[4][5][6].

Human face detection and recognition plays vital roles in various applications such as video surveillance and face image database organization. In face recognition the algorithm used is pca (principal component analysis), in which we identify an unidentified test image by comparing it with the recognized training images stored in the database as well as provide information concerning the person known. These techniques works fine under vigorous conditions like complex background, unlike face positions. These algorithms provide unlike rates of precision under different conditions as experimentally observed[7][8][9]10].

The face is our main focal point of notice in social life playing an vital role in assigning individuality and emotions. We can identify a number of faces learned throughout our lifespan and identify faces at a quick look even after years of departure. This skill is quite vigorous in spite of of large variation in optical stimulus due to changing condition, aging and diversion such as beard, glasses or changes in hairstyle. Computational models of face recognition are attractive because they can add not only to theoretical knowledge but also to practical applications. Computers that identify and recognize faces could be applied to a broad variety of responsibilities including criminal identification, security system, image and film processing, identity verification, tagging purposes and human-computer interaction[7][11][12].

In this present work, a dual feature adaptive model is defined for facial recognition and facial expression recognition. The presented model is defined under distance adaptive mapping. In section II, the presented work model is defined algorithmic approach. In section III, the results obtained from the work are discussed. In section IV, the results obtained from the work are presented.

II. RESEARCH METHODOLOGY

The presented work is defined to provide facial recognition and facial expression recognition for infant. The work is divided in three main stages. As the image is accepted as input, in first stage, the image enhancement is done. To improve the image features, the histogram equalization is applied. Once the adaptive features are obtained, in second stage, the feature extraction is performed. In this work, LDA and SURF methods are collectively defined to extract the features.

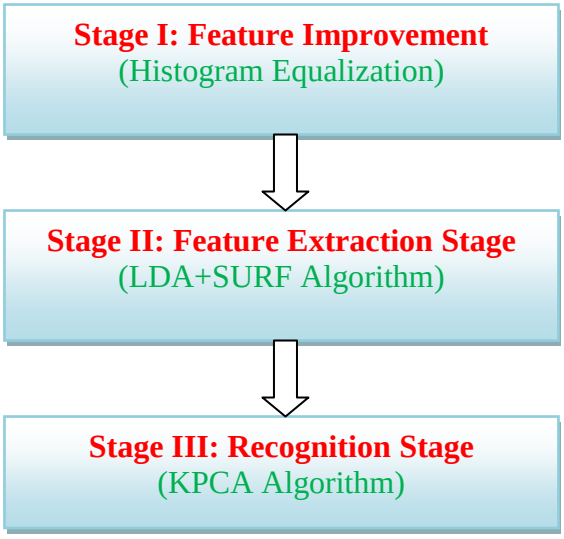

Figure 2 : Proposed Model

These features are here combined under fusion model. Based on these features, the final feature formed image is obtained. In the final stage, the PCA adaptive distance mapping is applied to perform the recognition. In this section all the work stages are defined in detail

A) Feature Improvement

To improve the accuracy of recognition process it is required to convert the image in the form of normalized image. The feature level improvement is here done to improve the feature of the image. This variation can occur because of bad light, environment vector or the camera alignment problem. If the raw input image is not normalized against illumination vector, the accuracy ratio will be affected. To improve the facial features against illumination, the median filter can be used. This filter is a non linear filter that is able to improve the image features. These will be able to assign the rank ordering the pixel level analysis respective to the centralized pixel specification.

B) Feature Extraction

The feature extraction algorithm is here been used to generate the feature set so that recognition robustness will be improved. Here the algorithm is defined to identify the ratio between the variation of the input face and the facial dataset. This recognition is here performed to identify the class by generating the scatter matrix. The determination of this scatter class is here based on the coefficient analysis. This determination of the class is given with the specification of probability class Pr and the mean value to all the classes. The scatter value respective to class C is gen here under. In this work, LDA and SURF adaptive method is defined for feature extraction.

The LBP adaptive feature descriptor is here applied to obtain the texture information under information change analysis under computational efficiency. This thresholding is here applied based on feature adaptive analysis. This feature adaptive model is here defined to obtain the neighbor feature analysis. This model is based on the central pixel analysis and based on this analysis the computational feature is obtained under thresholding approach.

SURF (Speeded Up Robust Features) is the relative feature descriptor model defined along with the specification of scaled and rotation vectors so that the invariant adaptive features will be obtained from the images. The compact information representation is here done by analyzing the spatial distribution under intensity analysis. The neighbor pixel analysis is here performed to generate the feature scale and provided the model for data sampling and smoothing under pyramid adaptive model. The integral feature analysis is here defined under the fast Hessian matrix. The directional neighbor pixel analysis is here applied to obtain the sample point so that the key point extraction will be done.

D) KPCA

Kernal Adaptive Principal Component Analysis (KPCA) is the feature adaptive model based on the distance relative to the database images. The distance analysis is here applied on the featured imagset. The intensity adaptive weighted feature map is performed on individual input image with all dataset images. These dataset images are identified to perform the relative recognition. The image that provided the maximum map with dataset image is considered as the recognized image. Once the image is recognized, the next work is to identify the expression class. In this work, distance adaptive weighted approach is applied for the same. The work is defined using three different expressions. These expressions are normal, happy and the cry expression. These expressions are specifically defined for infant faces.

III. RESULTS

The presented work is implemented in matlab environment to perform the infant face recognition. The dataset images are collected from different web sources. The properties of dataset are given here in table 1.

Table 1 : Dataset Properties

Property	**Values**
Database Name	**Infant Facial Dataset**
Number of Images	58
Number of Expression	3
Number of Persons	58
Image Format	JPG
Gender	MIX
Resolution	Random
Type	Color

The work is tested on multiple sampleset by applying the proposed algorithmic approach. The results of the recognition are given here under.

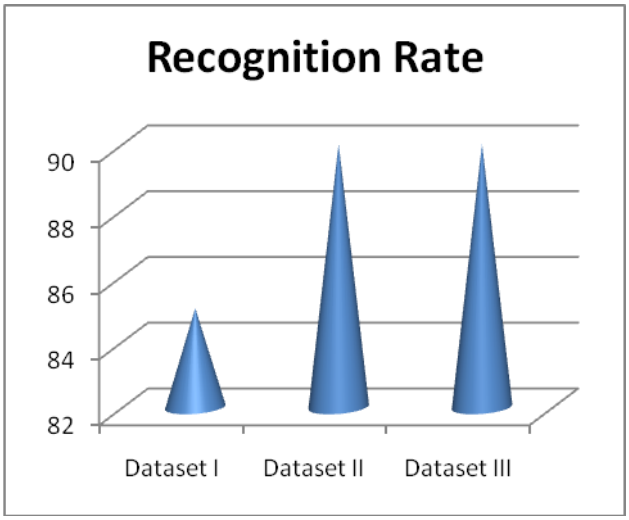

Table 2 : Recognition Rate Analysis

Here figure 2 is showing the recognition results obtained from the work. The results shows that the work is applied on different datasets. The recognition rate obtianed is upto 88% which is effectively high for such kind of smaller dataset.

IV. Conclusion

In this paper, a hybrid feature adpative model is presented for facial expression recognition for infant. The work is divided in three main stages. In first stage, the feature improvement is done. In second stage, the features are extracted using hybrid model. In final stage, the facial recognition and expression recognition is performed using KPCA approach.

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