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Implementation on Partial Face Recognition using Novel Approach

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ABSTRACT: Partial face images are produced in an unconstrained environment. A face may be occluded by sunglasses, a hat and a scarf, captured in various poses, positioned partially out of cameras field of view**.** Human face plays an important role in our social interaction, conveying people's identity but it is a dynamic object and has a high degree of variability in its appearances. The problem of recognizing an arbitrary patch of a face image remains largely unsolved. This study proposes a new partial face recognition approach, called Dynamic Feature Matching, which combines Fully Convolutional Networks and Sparse Representation Classification to address partial face recognition problem regardless of various face sizes. DFM does not require prior position information of partial faces against a holistic face.

KEYWORDS*:* Fully convolutional network, Dynamic feature matching, partial face recognition.

I.INTRODUCTION

The 21st century is a modern and scientific era in which a lot of progress has been achieved as to expedite humans for accomplishing their tasks. In support of above statement, nowadays use of computer technology has been an integral part of life. Computers are being used in pyramids of applications, which range from simple to complex problem solving methods. Among such contributions face recognition technology has emerged as useful tool to recognize features of faces through their inherent traits. And it has been one of the most researched areas in the field of pattern recognition and computer vision. However, due to its wide use in multitude of applications such as in biometrics, information security, law enforcement access control, surveillance system and smart cards. But it possesses many challenges for researcher that needs to be addressed. Face an object depends on facial expressions, which constitute meaningful features. For instance, pose invariance, illuminations and aging which are potential areas that require further investigation over previous work. The result of previous researches reveals that facial expressions are changing with respect to aging; therefore, they could not be permanently modelled in face recognition. The face recognition problem can be categorized into two main phases: 1) face verification and 2) face identification. For example, in real time system, face verification identifies the same person in the scene, and face identification who is this person in that scene. In the first phase it locates a face in an image. Similarly, in the second stage, it extracts features from an image for discrimination. After that they are matched with face database images in order to recognize correct face image. Face recognition system comprises of three main modules: pre- processing, feature selection, and classification. The researchers have suggested numerous algorithms and methodologies for recognizing a face in an effective and efficient manner. For this purpose, they have focused on detection and recognition of traits and features for individuals such as nose, eyes, mouth, face shape position, size, and beside relationship among traits and features. Furthermore, ongoing research in face recognition tries to develop such systems that could work well in an effective and efficient manner in multitude of real-world applications.

1.1 Motivation

To Get the Current Location of Searching user and Get Result from current Location and the idea of matching patterns is based on an observation that similar starting and destination nodes of two queries may result in similar shortest paths (known as the path coherence property).

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II.RELATED WORK

Literature survey is the most important step in any kind of research. Before start developing we need to study the previous papers of our domain which we are working and on the basis of study we can predict or generate the drawback and start working with the reference of previous papers.
In this section, we briefly review the related work on Finding partial face and their different techniques.

This paper considers the problem of Face recognition systems in real-world applications need to deal with a wide range of interferences, such as occlusions and disguises in face images. Compared with other forms of interferences such as no uniform illumination and pose changes, face with occlusions has not attracted enough attention yet.[1]

The major approach to approximate distances is the landmark-based approach which pre-compute and store a number of shortest path trees rooted at landmarks. While these methods easily attain preferable scalability, some of them have critical precision problems for close pairs and the other methods with better precision have three orders of magnitude slower query time. Consequently, focus of the research community is shifting toward under mentioned exact methods, leading to recent large improvement on exact methods.[2]

Face recognition (FR) is the problem of verifying or identifying a face from its image. It has received substantial attention over the last three decades due to its value both in understanding how FR process works in humans as well as in addressing many challenging real-world applications, including de-duplication of identity documents.[3]

In this paper, the author innovates as it proposes a deep learning and set-based approach to face recognition subject to aging. The images for each subject taken at various times are treated as a single set, which is then compared to sets of images belonging to other subjects. Facial features are extracted using a convolutional neural network characteristic of deep learning. This experimental result show that set-based recognition performs better than the singleton-based approach for both face identification and face verification. [4]

In this paper, a novel and efficient facial representation is proposed. It is based on dividing a facial image into small regions and computing a description of each region using local binary patterns.[5]

In this paper, author uses the approach which is purely data driven method which learns its representation directly from the pixels of the face. Rather than using engineered features, we use a large dataset of labelled faces to attain the appropriate invariances to pose, illumination, and other variation conditions.[6]

In this paper the author proposed framework first transforms the original pose-invariant face recognition problem into a partial frontal face recognition problem. A robust patch-based face representation scheme is then developed to represent the synthesized partial frontal faces. For each patch, a transformation dictionary is learnt under the proposed multi-task learning scheme. The transformation dictionary transforms the features of different poses into a discriminative subspace. Finally, face matching is performed at patch level rather than at the holistic level.[7]

In this paper, initially they requires three face poses for training purpose. Among them first pose is taken from front, second is from left side and the third face image is taken from right side. All the face images are processed in next phase for bi-parting these images and the entire images are converted into six partial phases. After conversion of these faces into six parts the provision is made to define the image classes. These image classes are used with the LDA feature extraction algorithm.[8]

Theauthor proposed a Multi-Scale Region-based CNNs (MR-CNN) model and achieves the highest performance for partial face recognition on NIR-Distance database. However, these methods require the presence of certain facial components and pre-alignment. To this end, we propose an alignment-free partial face recognition algorithm DFM that achieves better performance with higher computation efficiency.[9]

In this paper the author propose an alignment-free approach called multiple key points descriptor SRC (MKD-SRC), where multiple affine invariant key points were extracted for facial features representation and sparse representation based on classification (SRC) is used for classification.[10]

III.PROBLEM STATEMENT

In this paper, we recognized the problem on partial face that were does not exact matching in the different methodology. Partial face recognition (PFR) in an unconstrained environment is a very important task, especially in situations where partial face images are likely to be captured due to occlusions, out-of-view, and large viewing angle, e.g., video surveillance and mobile devices. However, little attention has been paid to PFR so far and thus, the problem of recognizing an arbitrary patch of a face image remains largely unsolved.Recognize an arbitrary face image captured in unconstrained environment.

IV.PROPOSED METHOD

In the proposed work we have taken the partial images as an input and perform various operations on that image like pre-processing, feature extraction, classification and if we found the match image which is related as a given input then display the result. For this processing we are using fully convolutional neural network (FCNN) algorithm and Multi-scale Region based convolutional neural network (MR-CNN) representation of classification.

In this we are using 2 modules i.e. User and Admin.**Module 1** - Administrator (Admin):- Admin Add user images and check user Details .**Module 2** - User (person):- Person have to add their partial image and check with the given dataset .

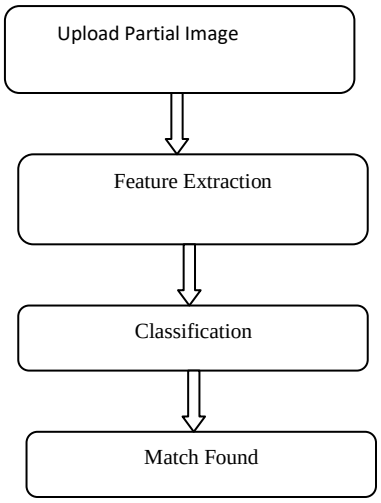

Fig.1 Flow diagram

Architecture

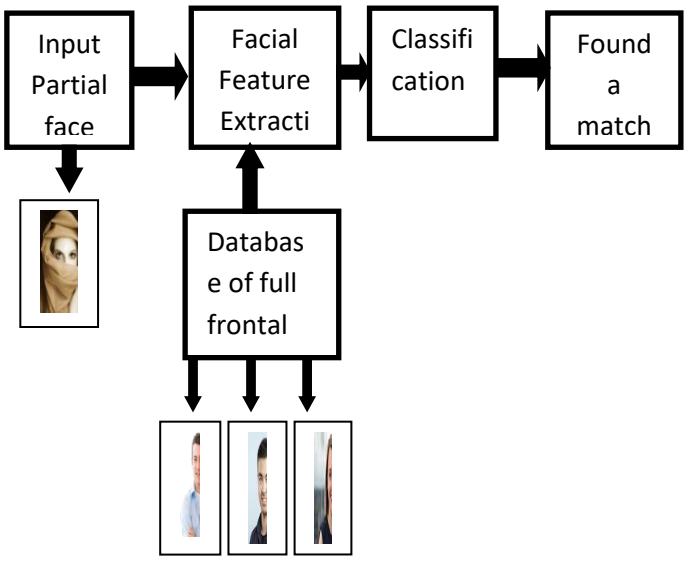

Fig.2 System Architecture

1. **Algorithm details**

Face Recognition using Principle Component Analysis

STEP 1: Prepare the Data

The first step is to obtain a set S with M face images. Each image is transformed into a vector of size N and place into the set.

$$S = \{\Gamma_1, \Gamma_2, \ldots, \Gamma_M\}$$

STEP 2: Obtain the Mean

After obtaining the set, the mean image ψ has to be obtained as,

$$\psi = \frac{1}{M}\sum_{n=1}^{M}\Gamma_n$$

STEP 3:Subtract the Mean from Original Image

The difference between the input image and the mean image has to be calculated and the result is stored inΦ.

$$\Phi_i = \Gamma_i - \psi$$

STEP 4: Calculate the Covariance Matrix

The covariance matrix C is calculated in the following manner

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$$C = \frac{1}{M}\sum_{n=1}^{M} \Phi_n \Phi_n^J$$

$$= AA^J$$

$$A = \{\Phi_1, \Phi_2, \ldots, \Phi_n\}$$

STEP 5: Calculate the Eigenvectors and Eigenvalues of the Covariance Matrix and Select the Principal Components

In this step, the eigenvectors (Eigen faces) i and the corresponding eigenvalues ** should be calculated. From M eigenvectors, only M' should be chosen, which have the highest eigenvalues. The higher the eigenvalue, the more characteristic features of a face does the particular eigenvector describe. Eigen faces with low eigenvalues can be omitted, as they explain only a small part of the characteristic features of the faces. After M' Eigen faces are determined, the "training" phase of the.

V.RESULTS AND DISCUSSIONS

Experiments are done by a personal computer with a configuration: Intel (R) Core (TM) i3- 2120 CPU @ 3.30GHz, 4GB memory, Windows 7, MySQL 5.1 backend database and jdk 1.8. This application is desktop application used tool for design code in Eclipse and execute. Some functions used in the algorithm are provided by list of libraries like OpenCV jar and JavaCV jar for face and eye detection purpose. The very first step in this system is take partial image as an input image then performs various functions on input image like pre-processing(Gray image and filtered image)and after pre-processing the second step in this systemto detect the Face, Eye region and the Eye through OpenCV libraries, and get output as face.

VI.CONCLUSION

Face detection as well as recognition are challenging problems and there is still a lot of work that needs to be done in this area.The face recognition is a subject of machine learning and Image Processing. That is frequently used for various different applications for authentication & secure access control due to their uniqueness. The proposed work is dedicated to design and implement a face recognition model that accept the partial or complete face images in order to identify the face class. In this context the three step process is proposed to work where in first phase the face images are partitioned into multiple face parts this step is termed here as the pre-processing of images. Secondly the images are processed for feature extraction. Finally different techniques are used to perform training on extracted face features and classes and the trained model is used for recognizing the faces. In near future the proposed model is implemented and their performance is provided.

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