Dynamic Feature Matching for Partial Face Recognition.

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.

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

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 the 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 research 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 the multitude of real-world applications.

Problem Statement

In this paper, we recognized the problem on partial face matching that does not do the exact matching in different situations. 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.

Objective and Scope

1. To recognize a suspect in the crowd.
2. To identify a face from its partial image.
3. To match the partial face with Actual image.
4. Face recognition mostly used for security purposes.

Literature Survey

1. In this paper, initially they require three face poses for the training purpose. Among them first pose is taken from front, second is from left side and the third face image is taken from the 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.

2. 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.

3. A drawback is that it is sensitive for the lighting conditions and the position of the head. Disadvantages-Finding the eigenvectors and eigenvalues are time consuming on PPC. The size and location of each face image must remain similar PCA (Eigen face) approach maps features to principal subspaces that contain most of the energy.

4. 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 deduplication of identity documents

5. 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.

6. In this paper, the 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.

7. 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.

8. 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.

9. The author 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.

10. 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.

Proposed Methodology

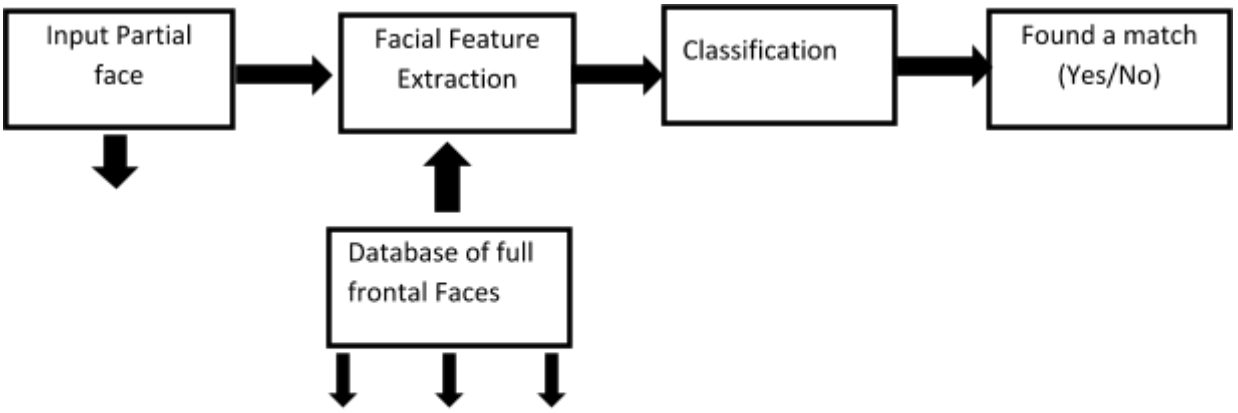

Fig: System Architecture

Explanation

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 (F-CNN) algorithm and Multi-scale Region based convolutional neural network (MR-CNN) representation of classification.

Hardware and Software Requirements

Hardware Requirements:

1. Processor - Dual core/Intel i3
2. Speed - 1.8 GHz
3. RAM - 2 GB (Min)
4. Hard Disk - 100 GB
5. Key Board - Standard Windows Keyboard
6. Mouse - Two or Three Button Mouse
7. Monitor /LCD - SVGA/LED

Software Requirements:

1. Operating System - Windows
2. Application Server - Apache Tomcat 7
3. Front End - HTML, JSP, CSS
4. Scripts - JavaScript.
6. Database - My SQL 5.0
7. IDE - Eclipse Oxygen
8. Coding Language - Java 1.8

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 the 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 the near future, the proposed model is implemented and their performance is provided.

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