Face Detection with Face Recognisation

A Report for the Evaluation 1 of Project 2

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1. ABSTRACT

A face recognition or detection system is one of the biometric information processes, its applicability is easier and working range is larger than others, i.e.; fingerprint, iris scanning, signature, etc. A face recognition system is designed, implemented and tested at Atılım University, Mechatronics Engineering Department. The system uses a combination of techniques in two topics; face detection and recognition.

The face detection is performed on live acquired images without any application field in mind. Processes utilized in the system are white balance correction, skin like region segmentation, facial feature extraction and face image extraction on a face candidate.

The face is one of the easiest ways to distinguish the individual identity of each other. Human face detection and recognition play important roles in many applications such as video surveillance and face image database management. In our project, we have studied worked on both face recognition and detection techniques and developed algorithms for them.

Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Human face recognition procedure basically consists of two phases, namely face detection, where this process takes place very rapidly in humans, except under conditions where the object is located at a short distance away.

In face recognition the algorithm used is PCA(principal component analysis), MPCA(Multi-linear Principal Component Analysis) and LDA(Linear Discriminant Analysis) in which we recognize an unknown test image by comparing it with the known training images stored in the database as well as give information regarding the person recognized. These techniques works well under robust conditions like complex background, different face positions. These algorithms give different rates of accuracy under different conditions as experimentally observed.

In face detection, we have developed an algorithm that can detect human faces from an image. We have taken skin colour as a tool for detection. This technique works well for Indian faces which have a specific complexion varying under certain range. We have taken real life examples and simulated the algorithms in MATLAB successfully.

2. INTRODUCTION

2.1 Overall Description :

1. "FACE RECOGNIZATION" the face recognition problem can be divided into two main stages: face verification (or authentication), and face identification (or recognition).

2. The detection stage is the first stage; it includes identifying and locating a face in an image. The recognition stage is the second stage; it includes feature extraction, where important information for discrimination is saved, and the matching, where the recognition result is given with the aid of a face database.

3. The face is our primary focus of attention in social life playing an important role in conveying identity and emotions. We can recognize a number of faces learned throughout our lifespan and identify faces at a glance even after years of separation. This skill is quite robust despite of large variations in visual stimulus due to changing condition, aging and distractions such as beard, glasses or changes in hairstyle. Computational models of face recognition are interesting because they can contribute not only to theoretical knowledge but also to practical applications. Computers that detect and recognize faces could be applied to a wide variety of tasks including criminal identification, security system, image and film processing, identity verification, tagging purposes and human-computer interaction. Unfortunately, developing a computational model of face detection and recognition is quite difficult because faces are complex, multidimensional and meaningful visual stimuli. Face detection is used in many places now a days especially the websites hosting images like picassa, photobucket and facebook. The automatically tagging feature adds a new dimension to sharing pictures among the people who are in the picture and also gives the idea to other people about who the person is in the image. In our project, we have studied and implemented a pretty simple but very effective face detection algorithm which takes human skin colour into account. Our aim, which we believe we have reached, was to develop a method of face recognition that is fast, robust, reasonably simple and accurate with a relatively simple and easy to understand algorithms and techniques. The examples provided in this thesis are real-time and taken from our own surroundings.

2.2 PURPOSE

You might be good at recognizing faces. You probably find it a cinch to identify the face of a family member, friend, or acquaintance. You're familiar with their facial features — their eyes, nose, mouth — and how they come together.

1. A picture of your face is captured from a photo or video. Your face might appear alone or in a crowd. Your image may show you looking straight ahead or nearly in profile.

2. Facial recognition software reads the geometry of your face. Key factors include the distance between your eyes and the distance from forehead to chin. The software identifies facial landmarks — one system identifies 68 of them — that are key to distinguishing your face. The result: your facial signature

3. A determination is made. Your faceprint may match that of an image in a facial recognition system database.

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2.3 SCOPE

2.3.1 Existing System Features

1. Apple first used facial recognition to unlock its iPhone X, and continues with the iPhone XS. Face ID authenticates — it makes sure you're you when you access your phone. Apple says the chance of a random face unlocking your phone is about one in 1 million.Facial recognition software can, in essence, take roll. If you decide to cut class, your professor could know. Don't even think of sending your brainy roommate to take your test
2. Facebook uses an algorithm to spot faces when you upload a photo to its platform. The social media company asks if you want to tag people in your photos. If you say yes, it creates a link to their profiles. Facebook can recognize faces with 98 percent accuracy.
3. Some companies have traded in security badges for facial recognition systems. Beyond security, it could be one way to get some face time with the boss.
4. Retailers can combine surveillance cameras and facial recognition to scan the faces of shoppers. One goal: identifying suspicious characters and potential shoplifters
5. You might be accustomed to having an agent scan your boarding pass at the gate to board your flight. At least one airline scans your face.

2.3.2 Proposed System Features

1) Student Registration
2) Face Detection
3) Face Recognition
    a) Feature Extraction
    b) Feature Classification 4.
4) Attendance management system.

Attendance management will handle: -

a) Automated Attendance marking –
b) Manual Attendance marking
c) Attendance details of users.

3. LITERATURE SURVEY

Before Proceeding with the design and implement of this project, I have studied many existing "Online Apps". This study helped me a lot to know the various features of different applications. Face recognition is such a challenging yet interesting problem that it has attracted researchers from different backgrounds. It is due to this fact that the literature on face recognition is vast and diverse. The earliest work on face recognition can be traced back at least to the 1950s additionally; the research on automatic machine recognition of faces really started in the 1970s, but a fully automatic face recognition system based on a neural network was reported back in 1997.

The aim of all the researches was to make face recognition as automated and accurate as possible through various types of inputs such as static images, video clips, etc. so as to increase its applications in real world. Computational methods of face recognition need to address numerous challenges. These type of difficulties appear because faces are need to be represented in such a way that best utilizes the available face information to define a specific face from all the other faces in the database. Also, extracting such detailed facial features can be used in slandering the search and enhancing recognition.

The problem of automatic face recognition involves three key steps:

(1) Face Detection

(2) Feature extraction

(3) Recognition

Sometimes, the steps are not totally separated. For example, the facial features used for face recognition are often used in face detection. Face detection and feature extraction can be achieved simultaneously. Other than that accuracy depends on various factors such as, the nature of the application, size of the training and testing database, clutter and variability of the background, noise, occlusion, and computing requirements, etc. and a fully automatic face recognition system needs to perform all the three steps accurately.

It's evident that after more than 30 years of research and development, basic 2D face recognition and other image processing applications have reached a mature level and many commercial systems are available for various applications. Some of the major reasons for this success are faster computers, algorithmic improvements, access to large amounts of research tools and datasets, advances in machine learning and perception, the increase in affordable neural networks and now the data-hungry deep learning methods; which have started to dominate accuracy benchmarks around 2011. Various surveys also present factual data indicating that error rates in image processing tasks have fallen significantly since 2012 and are expected to for fall further in near future.

4. PROBLEM STATEMENT

A complete face recognition system includes face detection, face preprocessing and face recognition processes. Therefore, it is necessary to extract the face region from the face detection process and separate the face from the background pattern, which provides the basis for the subsequent extraction of the face difference features. The recent rise of the face based on the depth 8 of learning detection methods, compared to the traditional method not only shorten the time, and the accuracy is effectively improved. Face recognition of the separated faces is a process of feature extraction and contrast identification of the normalized face images in order to obtain the identity of human faces in the images.

5.PROPOSED MODEL

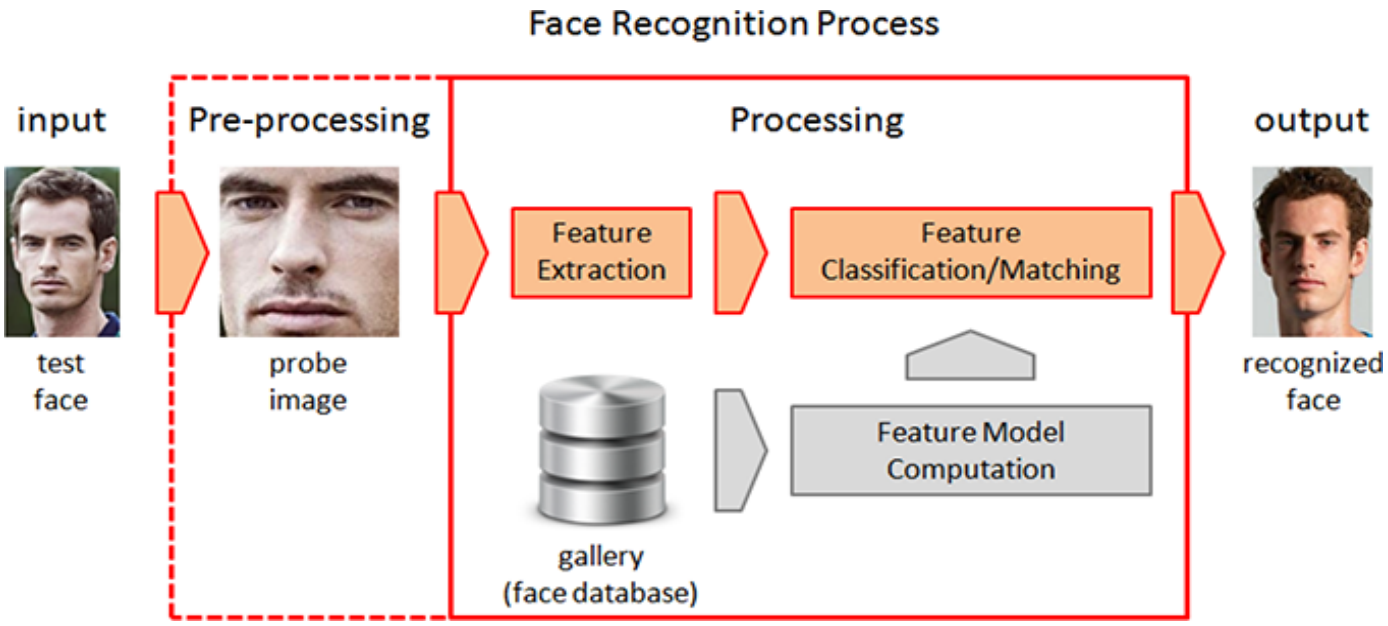

Figure: Face Recognition

6. IMPLEMENTATION

Software Requirements:-

- **Software**: Opencv
- **Languages**:Python
- **Database**: MySQL
- **Hosting**: Github

Hardware Requirements:-

- Browser for surfing
- Online Server
- Domain name

7. REFERENCE

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