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Real-Time Face Recognition and Detection Using Python

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Abstract: ***While humans can recognize faces without much effort, facial recognition is a challenging pattern recognition problem in computing. Facial recognition systems attempt to identify a human face, which is three-dimensional and changes in appearance with lighting and facial expression, based on its two-dimensional image. To accomplish this computational task, facial recognition systems perform four steps. First face detection is used to segment the face from the image background.***
In the second step the segmented face image is aligned to account for face pose, image size and photographic properties, such as illumination and grayscale. The purpose of the alignment process is to enable the accurate localization of facial features in the third step, the facial nature extraction. Features such as eyes, nose and mouth are pinpointed and measured in the image to represent the face. The so established feature vector of the face is then, in the fourth step, matched against a database of faces.
Keywords: face, detection, recognition, system, OpenCV

I. INTRODUCTION

The basic concept here is that the face to be recognized is compared with some training set of known faces.
In detection we need just to determine if there is some face in the image, but in recognition we want to determine whose face it is.
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.
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
It can identify multiple faces in a real –time video recording.
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 a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene.

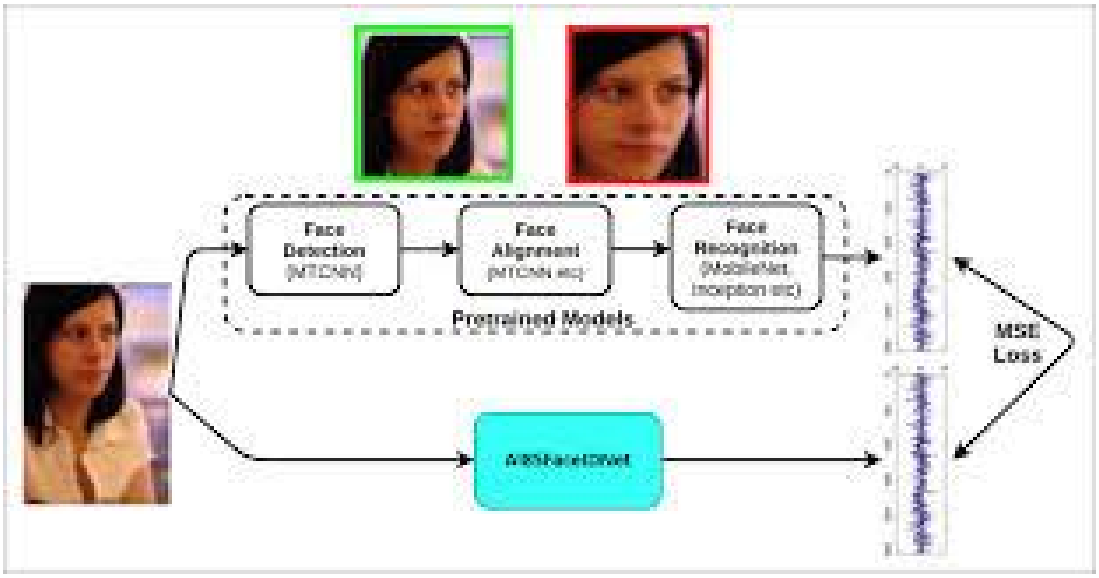
II. PROBLEM DEFINITION

Over the past decade face detection and recognition have transcended from esoteric to popular areas of research in computer vision and one of the better and successful applications of image analysis and algorithm based understanding. Because of the intrinsic nature of the problem, computer vision is not only a computer science area of research, but also the object of neuro-scientific and psychological studies also, mainly because of the general opinion that advances in computer image processing and understanding research will provide insights into how our brain work and vice versa. A general statement of the face recognition problem (in computer vision) can be formulated as follows: given still or video images of a scene, identify or verify one or more persons in the scene using a stored database of faces. Facial recognition generally involves two stages:

1) *Face Recognition*: Face Recognition where that detected and processed face is compared to a database of known faces, to decide who that person is.
2) *Face Detection:* Face Detection where a photo is searched to find a face, then the image is processed to crop and extract the person's face for easier recognition.

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III.FIGURES



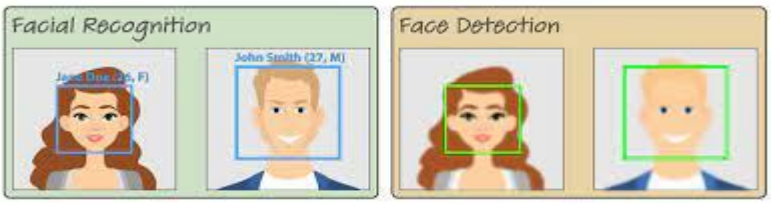


Fig: face recognition and face detection

IV.LITERATURE SURVEY

As one of the most successful applications of image analysis and understanding, face recognition has recently received significant attention, especially during the past years. At least two reasons account for this trend: the first is the wide range of commercial and law enforcement applications, and the second is the availability of feasible technologies after 30 years of research. Even though current machine recognition systems have reached a certain level of maturity, their success is limited by the conditions imposed by many real applications. For example, recognition of face images acquired in an outdoor environment with changes in illumination and/or pose remains a largely unsolved problem. In other words, current systems are still far away from the capability of the human perception system. This paper provides an up-to-date critical survey of still- and video-based face recognition research. There are two underlying motivations for us to write this survey paper: the first is to provide an up-to-date review of the existing literature, and the second is to offer some insights into the studies of machine recognition of faces. To provide a comprehensive survey, we not only categorize existing recognition techniques but also present detailed descriptions of representative methods within each category. In addition, relevant topics such as psychophysical studies, system evaluation, and issues of illumination and pose variation are covered.

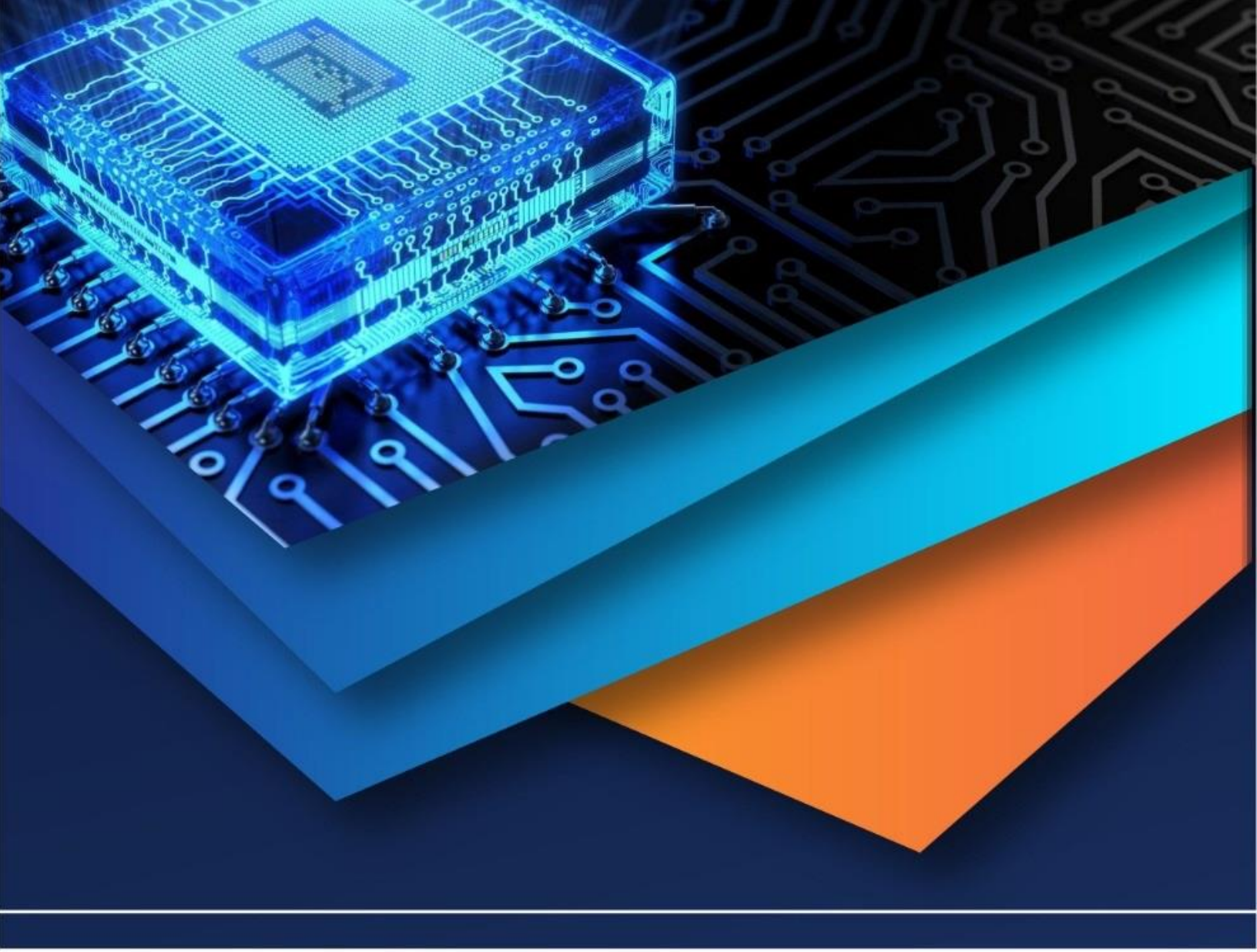
V. CONCLUSIONS

Facial recognition system have been associated generally with very costly top secure application. Today the core technologies have evolved and the cost of equipment is going down. Certain applications of face recognition technology are now cost effective, reliable and highly accurate. Fast and convenient in identifying a person. Great use in society, crime detection, security use and many other aspects. Face recognition is relatively easy to do in real-time if you are training on someone and then instantly trying to recognize them after, since it will be the same camera, and background will be the same, their expressions will be almost the same, the lighting will be the same, and the direction you are viewing them from will be the same. So you will often get good recognition results at that moment. But once you try to recognize them from a different direction or from a different room or outside or on a different time of the day, it will often give bad results!

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