CRIMINAL FACE DETECTION

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ABSTRACT: Image based face recognition is a very interesting field in research and applications. Various face recognition methods have been devised and applied over the past several years of technological development. Fields like security and surveillance have widely used face recognition over the years as people are very concerned as to identifying and catching criminals or people with mal intentions. Catching them without being able to promptly recognize and their faces has been a major problem.A person's facial features are dynamic and have variable appearances, which makes it a problem to be very accurate and fast in identification of a person. Not only this, security access controls through face recognizers makes it highly difficult for hackers and crackers to use a person's identity or data. The basic objective of this project hence is to understand several pre-existing face detection and recognition algorithms and then provide a viable solution for image based facial recognition with better accuracy, higher speed and efficiency so as to help develop a technologysuch which can help catch criminals. Many facial databases have been considered so as to differentiate them in conditions of changes in poses, illuminations and emotions. Various other conditions to obstruct identification offaces are discussed later.

Keywords- *Criminal Identification; facial recognition; Haar classifier; OpenCV*

1. INTRODUCTION

A face recognition is one of the most challenging topics in computer vision today. It has applications ranging from security and surveillance to entertainment websites. Many process of recording, studying, and recognizing faces. Many individuals do not approve of surveillance systems which take numerous photographs of people who have not authorized this action. Allenges exist for face recognition. The robustness of the system can be obstructed by humans who alter their facial features through wearing colored contact lenses, growing a mustache, putting on intense make-up, etc.

1.1 Introduction to the project

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1.2 Motivation

The motivation behind this project is to provide the ease to police personnel in order to find criminals from anywhere without wasting the time and cost. This application also helps to maintain records of criminals, one can also find all the details of the criminal in our application. Therefore this application helps police in many ways.

1.3 Problem Identification

There is no consult thing regarding criminal face detection in india , although india is a developing country and are working / using these face detection projects by which they are able to find the criminals easily organs like eyes, ears, nose,by which they can easily recognize the face of the criminals in any difficult condition, so this project help the policeof our country and help them by matching the imaginary data / sketch or the image with the complexity of photo matching .so we remove the complexity from the image and then matches with the criminal database ,if the data has been matches with the current existing record it will be very beneficial for the department

1.4 Algorithms

1. Algorithms Available in Python for Face Detection

- OpenCV Haar Cascade Face Detection
- Dlib HoG Face Detection
- OpenCV Deep Learning-based face Detection
- Dlib Deep Learning-based Face Detection
- Mediapipe Deep Learning-based Face Detection

2. Which algorithms are best and which one we selected and why?

- There are lot of algorithms of face detection available in python but the best one is Mediapipe face detection. Mediapipe face detection based on the Deep learning

.• It is the fastest one and also pretty accurate. In fact, this one has the best trade-off between speed and accuracy and also gives a few facial landmarks (key points)

.• Otherwise, if you have some environmental restrictions and cannot use the Mediapipe face detector, then the next best option will be OpenCV DNN Face Detector as this one is also pretty accurate but has higher latency

2. LITERATURE REVIEW

2.1 Existing System

As the crime rate and criminals are increasing dayby day managing, finding and tracking these criminals is a major issue for police personnel.
There are application which will help police department to store the records and data about a criminal but these applications won't help in finding those criminals. Criminal details were mainly managed using records books or stored as software records in the database. Previously when a criminal is found guilty the picture of the criminal is being taken and stored in records but these pictures serve no purpose. The existing methods will only help in managing criminal records and those methods will not finding criminals from any location.Criminal record generally contains personal information about particular person along with photograph. To identify any criminal we need some identification regarding person, which are given by eyewitnesses. Based on the details given by eyewitnesses, the criminal who did the crime willbe identified manually.

2.2 Disadvantages of Existing System

It is not possible to detect criminal from any location

- Existing methods only provide data storage and security for data but not livetracking.There was no application which will find criminals from CCTV footage

.• Criminal details were stored manually in a record and it requires lot of work

- Information can be lost or manipulated in records easily.
- Previous applications were not 100 percent accurate and this leads to inaccurate information of criminal.

3. IMPLEMENTATION

The face detection algorithm proposed by Viola and Jones is used as the basis of our design [4]. The face detection algorithm looks for specific Haar features andnot pixels of a human face [5]. When one of these features is found, the algorithm allows the face candidate to pass to the next stage of detection. A facecandidate is a rectangular section of the original image which is called as a sub-window. Generally, these sub windows have a fixed size (typically 24×24 pixels).

This sub-window is often scaled in order to obtain a variety of different size faces. The algorithm scans the entire image with this window and denotes each respective section a face candidate [4].

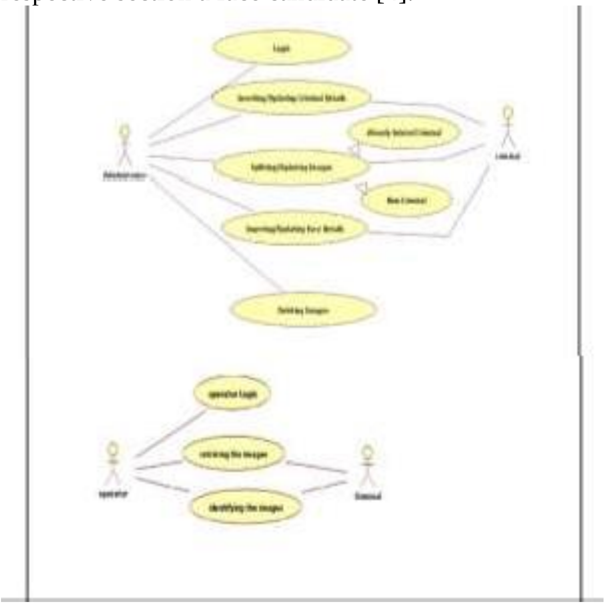


Fig.3: Architecture diagram

Import the required modules:

The Modules required to perform the facial recognition are cv2, os, image module and numpy. cv2 is the OpenCV module and contains the functions for face detection and recognition. OS will be used to maneuver with image and directory names. First, we use this module to extract the image names in the database directory and then from these names individual number is extracted, which is used as a label for the face in that image. Since, the dataset images are in gif format and as of now, OpenCV does not support gif format, Image module from PIL is used to read the image in grayscale format. Numpy arrays are used to store the images.

Load the face detection Cascade:

To Load the face detection cascade the first step is to detect the face in each image. Once we get the region of interest containing the face in the image, we use it for training the recognizer. For the purpose of face detection, we will use the Haar Cascade provided by OpenCV. The haar cascades that come with OpenCV are located in the directory of OpenCV installation. haarcascade frontalface default.xml is used for detecting the face. Cascade is loaded using the cv2 CascadeClassifier function which takes the path to the cascade xml file. if the xml file is in the current working directory, then relative path is used.

Create the Face Recognizer Object:

The next step involves creating the face recognizer object. The face recognizer object has functions like FaceRecognizer.train() to train the recognizer and FaceRecognizer.predict() to recognize a face [13]. OpenCV currently provides Eigenface Recognizer, Fisherface Recognizer and Local Binary Patterns Histograms(LBPH) Face Recognizer. We have used LBPH recognizer because Real life isn’t perfect. We simply can’t guarantee perfect light settings in your images or 10 different images of a person. LBPH focus on extracting local features from images. The idea is to not look at the whole image as a high-dimensional vector but describe only local features of an object. The basic idea of Local Binary Patterns is to summarize the local structure in an image by comparing each pixel with its neighbourhood. LBP operator is robust against monotonic gray scale transformations.

Prepare the training set and Perform the training:

To create the function to prepare the training set, we will define a function that takes the absolute path to the image database as input argument and returns tuple of 2 list, one containing the detected faces and the other containing the corresponding label for that face. For example, if the ith index in the list of faces represents the 4th individual in the database, then the corresponding ith location in the list of labels has value equal to 4. Now to perform the training using

the Face Recognizer. Train function. It requires 2 arguments, the features which in this case are the images of faces and the corresponding labels assigned to these faces which in this case are the individual number that we extracted from the image names.

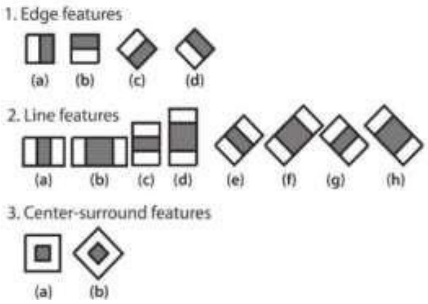
Testing:

For testing the Face Recognizer, we check if the recognition was correct by seeing the predicted label when we bring the trained face in front of camera. The label is extracted using the os module and the string operations from the name of the sample images folder. Lower is the confidence score better is the prediction.

4. TECHNIQUES

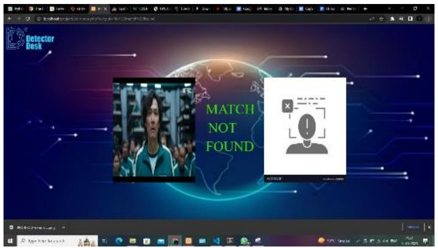
Haar Features:

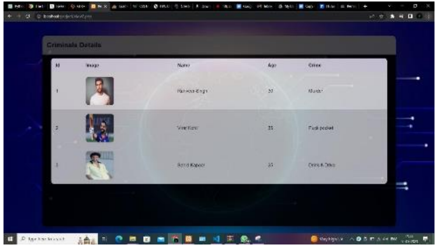
A simple rectangular Haar-like feature can be defined as the difference of the sum of pixels of areas inside the rectangle, which can be at any position and scale within the original image. This modified feature set is called 2-rectangle feature. Viola and Jones also defined 3-rectangle features and 4-rectangle features. Faces are scanned and searched for Haar features of the current stage. The weight and size of each feature and the features themselves are generated using a machine learning algorithm from AdaBoost [4][8]. The weights are constants generated by the learning algorithm. There are a variety of forms of features as seen below:



5.

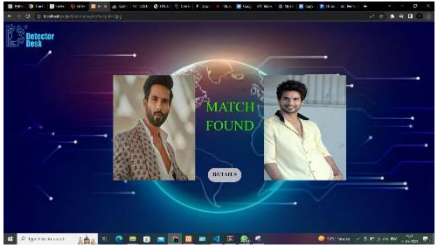
EXPERIMENTAL RESULTS

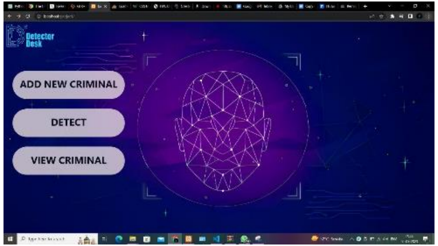


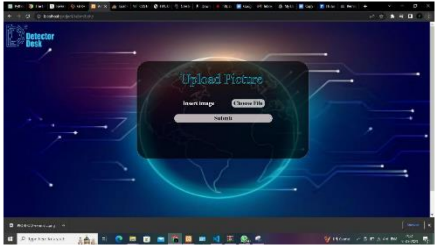


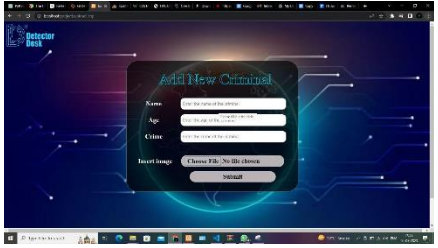
Criminals Details

Id	Image	Name	Age	Crime
1		Ranveer Singh	30	Murder
2		Virat Kohli	35	Pick pocket
3		Shahid Kapoor	25	Drink & Drive









Name Enter the name of the criminal

Age Enter the age of the criminal

Crime Enter the crime of the criminal

Insert image No file chosen

5. CONCLUSION

After considering all the facts present in introduction section, we did research in different applications and came up with a solution. Real-time criminal identification system will help police to control crime rate. This application helps them in many different ways. With the advancement in security technology and installation of cameras throughout the public areas, it will become easier for police personnel to monitor, track and find criminals from police control room using this application. In future advanced face recognition techniques can be used to improve the results and login page must be created so that any police personnel can access this application remotely. Moreover if a criminal is found in a particular zone then alert messages should be send to nearby police stations. The application that is developed is a simple and user friendly. By using advanced CSS styles and different front-end technologies, interface of the application can be developed more according to user requirements.

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