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Automatic Face Recognition and Detection for Criminal Identification Using Machine Learning

Prof. R. A. Nikam[1], Varankar Vrushali[2], Pawar Shubham[3], Mali Prayag[4], Jadhao Rucha[5]
[1]*Assistant Professor, Information Technology, APCOER Pune, Maharashtra, India*
[2, 3, 4, 5]*B.E Student, Information Technology, APCOER Pune, Maharashtra, India*

Abstract: ***With the use of machine learning technologies, discovering connections and patterns among various types of data has gotten much easier. Finding out what kind of crime might happen given the location where it has previously occurred is the main goal of this research. We have created a model utilizing the machine learning concept using a training set of data that has been cleaned up and transformed. In contemporary civilization, criminal activity is growing dramatically. Effectively identifying criminals to stop crime is the police's principal challenge, but there aren't enough policemen to go around. There are numerous technical approaches to apprehend criminals, yet many of them are ineffective. In this project, a face detection and recognition system for criminal identification is created using a machine learning algorithm. This system will be able to instantly differentiate the 3D faces of criminals and recognize their faces. This system's one-shot learning method only requires a single image of the criminal to identify him. The objective is to identify the criminal from a distance, extract the criminal's information from the database, and notify the police personnel of the location where the criminal was being observed by a camera.***
Keyword: ***machine learning, database, criminal identification, recognition system***

I. INTRODUCTION

Criminal records contain a person's picture and personal information about them. We must be able to identify any offender in order to track them down. Based on testimony from a witness, Identification may be based on fingerprints, eyes, DNA, and other characteristics. Face identification is one use. 9. The face, which is essential for communicating identity and emotion, is our main point of emphasis during social encounters. The human brain is extraordinarily good at remembering and recognizing faces, despite the fact that it can be difficult to deduce traits like intelligence or character from a person's face.

An image is compared to a database of images 5 in a facial recognition system to see whether there is a match. Each facial image may be recognized by using the RGB values for the eye colour, face width, and height along with different ratios..

This technology aims to find crooks in any department that is conducting an investigation. Using this technique, the photographs of criminals are cut into four slices: the forehead, eyes, nose, and lips after their photos and identifying details are entered in a database. These images are once more saved in another database record to aid identification. In order to access the database and retrieve the face's image, witnesses will select the slices that appear on the screen. If the criminal's record is already 9 in the database, this strategy offers a very welcoming environment for the operator and the witnesses to readily identify the offender. The objective of this research is to identify a person from previously taken photos. The developed method heralds the start of face detection and identification for video monitoring.

A. Problem definition

To develop a program that will allow for remote criminal registration and tracking using criminal data this program offers two options for identifying criminals. In one way, the criminal's photos are manually provided, and in the second, real-time live capture is used. Humanity is seriously threatened by crime. Person recognition is a challenging issue to resolve in the field of image processing. Images with multiple sources may be more susceptible to noise and illumination. Face recognition in noisy, low-resolution photos can be difficult. The acquired image could also have a very high dimensionality. To solve these problems, preprocessing techniques must be applied. Preprocessed images can improve system performance and accuracy.

B. Project Objective

1) Face recognition software-based real-time criminal identification. The main goal is to assist law enforcement in finding the criminals.
2) This application's goal is to provide information about a certain criminal that we have tracked down.

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3) Police officers can use this program to find a criminal wherever, anytime.
4) Any police officer can utilize this program from anywhere at any time by connecting to the internet.

C. Scope of Project

To develop a program that will allow for remote criminal registration and tracking using criminal data this program offers two options for identifying criminals. In one way, the criminal's photos are manually provided, and in the second, real-time live capture is used.

II. LITERATURE SURVEY

.K. Kranthi Kumar a, , Y. Kasiviswanadham a , D.V.S.N.V. Indira a , Pushpa Priyanka palesetti b , Ch.V. Bhargavi cEt.al Today's civilisation is experiencing a sharp increase in crime. The police's biggest challenge to preventing crime is effective criminal identification, but there are simply too few policemen on the street at any given moment. There are various technical methods for catching criminals, yet many of them are unsuccessful. In this paper, a multi-task cascade neural network is used to construct a face detection and recognition system for criminal identification. This system will be able to automatically and in real-time recognize the faces of criminals.

Ajay Gurav, Alireza Chevelwalla, Sachin Desai, Prof. Sumitra Sadhukhan et.al In order to provide a comprehensive solution for image-based face identification and recognition with greater accuracy, this research aims to assess five face detection and recognition algorithms, better response rate, and a first step for video surveillance. A solution is proposed based on trials carried out on multiple face-rich datasets in terms of individuals, position, emotions, and light.

Ruchi Jayaswal; Mansih Dixit et.al .Facial recognition has received a lot of attention from academics in general. In order to produce a facial characteristic, or a visual depiction of a victim's face, forensic surveillance is necessary since crime rates rise daily. Several methodologies have been used by numerous researchers to contribute to this field of study. The technology only gets a good 1 for performance because real-time facial recognition is still a painstaking procedure. In this post, we'll compare two models for facial recognition. The first is the conventional approach, and the second is the deep learning approach utilizing real-time data. After contrasting these methods with different algorithms, it will be decided whether or not the models accurately predict a certain outcome on the same dataset.

Souhail Bakkali; Muhammad Muzzamil Luqman; Zuheng Ming; Jean Christophe Burie et.al Numerous face identification algorithms have attained cutting-edge performance in terms of accuracy and extraordinarily high speed in unrestricted applications (CNNs) as a result of the development of deep convolutional neural network techniques. However, face detection on identity documents in unrestricted circumstances has not been thoroughly investigated due to a lack of publicly available datasets, the variety of face picture orientation, the complex background and lighting, defocus, and the fluctuating illumination of camera acquired photos. We study three cutting-edge face detection techniques based on general pictures, namely Cascade-CNN, MTCNN, and PCN, for face detection in camera-captured photos of identification documents, given different image quality ratings, in order to more effectively handle this issue.

Pallavi R. Wankhade and Mayuri S. Takore et.al. 5. Criminal records frequently contain personal information and pictures of vulgar people. We require some information about the person in order to identify any criminals, and the viewer provides this information. Face recognition is frequently made difficult by the format and grouping of the collected image segments. Usually, we write computer code to address this problem. There are several ways to identify someone, such by looking at their fingerprints or eyes. Every application makes use of face recognition. Since the face is so important for creating identification and conveying emotion, it is the main topic of attention in social interaction courses. Despite the incredible ability of humans to recognize faces, it is questionable if one can infer characteristics like intelligence or character from faces.

Chuah Chai Wen, Isredza Rahmi A. Hamid, Md. Jamri Saidi, Nurul Azma Abdullah, and Nurul Hidayah Ab Rahman In this study, a renowned The well-known Principal Component Analysis methodology was used to create an automated facial recognition system for criminal information. Using this technique, faces will be automatically located and recognized. This can assist law enforcement in locating or identifying the suspect if there aren't any thumbprints at the crime scene. The results show that 80 percent of the input photographs can be matched to template information.

Pournima Paman Patel, Chaudhari Vrushali Kishor, Snehal Prakash Sonar, Prarthana Sandip Patil, et al. 8. The goal of this research is to examine face recognition and discovery methods and to present a thorough image-based method for face location and recognition that has a foundational advantage for video observation, improved accuracy, and a better reaction rate. The setup was created using research on several face-made databases, including studies on people, position, feelings, and light.

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III. ALGORITHM

A. Haar Cascade

It is effective to employ Haar Cascade classifiers for object detection. In their paper using a Boosted Cascade of Simple Features for Rapid Object Detection, Paul Viola and Michael Jones initially introduced this method. Using the machine learning-based Haar Cascade approach, a sizable number of both positive and negative images are used to train the classifier.

Positive images – These images contain the images which we want our classifier to identify.

Negative Images – Images of everything else, which do not contain the objective, want to detect.

B. Steps

- Step 1. Feature Selection for Haar
- Step 2. Component Image Representation
- Step 3. Adaboost Instruction
- Step 4. The Architecture of a Cascade Classifier

IV. BLOCK DIAGRAM

The photographs originate from the registration procedure, where we store a person's live face shots. A SQLite database is used to store images. Criminal records are kept on file, along with identification documents and pictures of the individuals. The features are compared using the function of the face-recognition library.

We are developing a desktop program that will be intuitive and To begin with, we must register criminals and store their face photographs in the database. Then we use CNN to perform real-time training, and the training images are then saved in a folder. Then, if the criminal appears in front of the camera, the Harr Cascade Algorithm is used to recognize the person, records are retrieved from a database, and the output is displayed on screen.

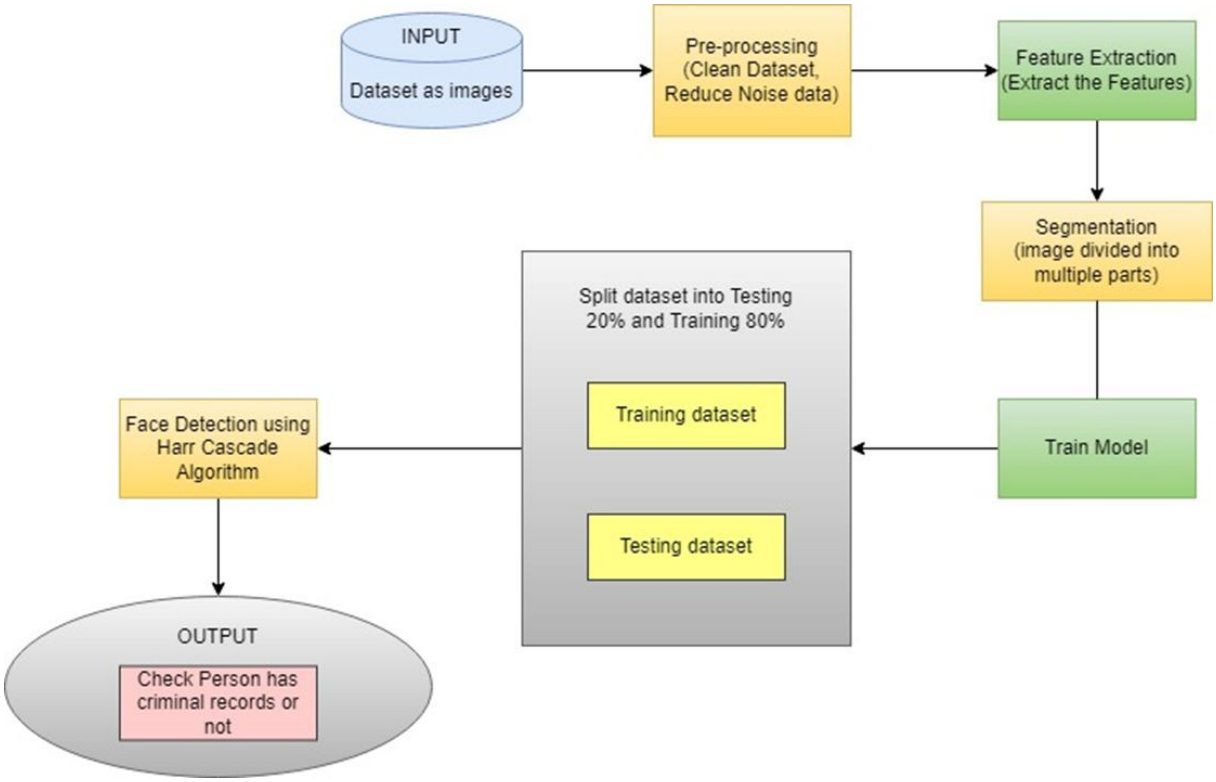


Fig 4.1 : System Architecture

V. ADVANTAGES:

It helps police officers in their efforts to find and apprehend criminals because it takes very little manpower and is quite inexpensive to run. Because the data cannot be changed or removed in this program, police or investigation departments can utilize this technology to identify offenders from their faces.

VI. DISADVANTAGES

Information can easily be lost or changed in records. Criminal facts were manually entered into records, which require a lot of labour.

VII. APPLICATION:

1) The facial recognition system application aids in the identification of criminals by police personnel.
2) It offers information on a particular criminal we're hunting for.
3) Police officers can use this program to find a criminal wherever, anytime.
4) Any police officer can utilize this program from anywhere at any time by using the internet.

VIII. RESULTS



Fig 8.1 : GUI Main Page

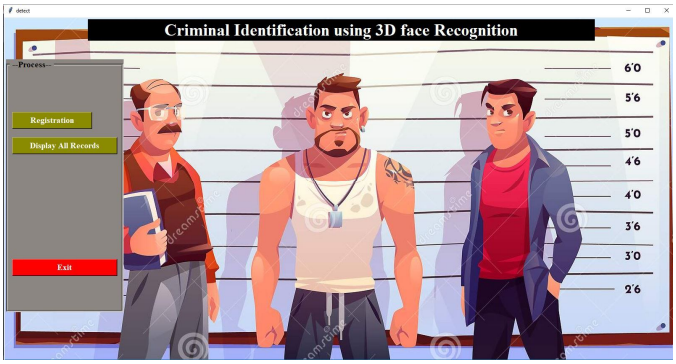


Fig 8.2 : Home Page

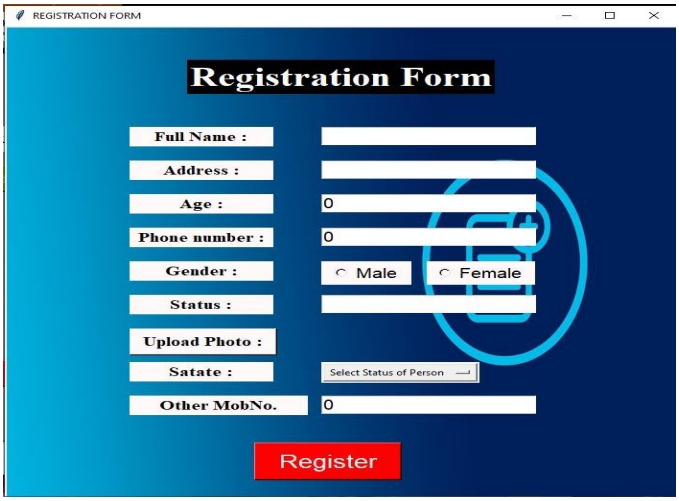


Fig 8.3 : Registration Page



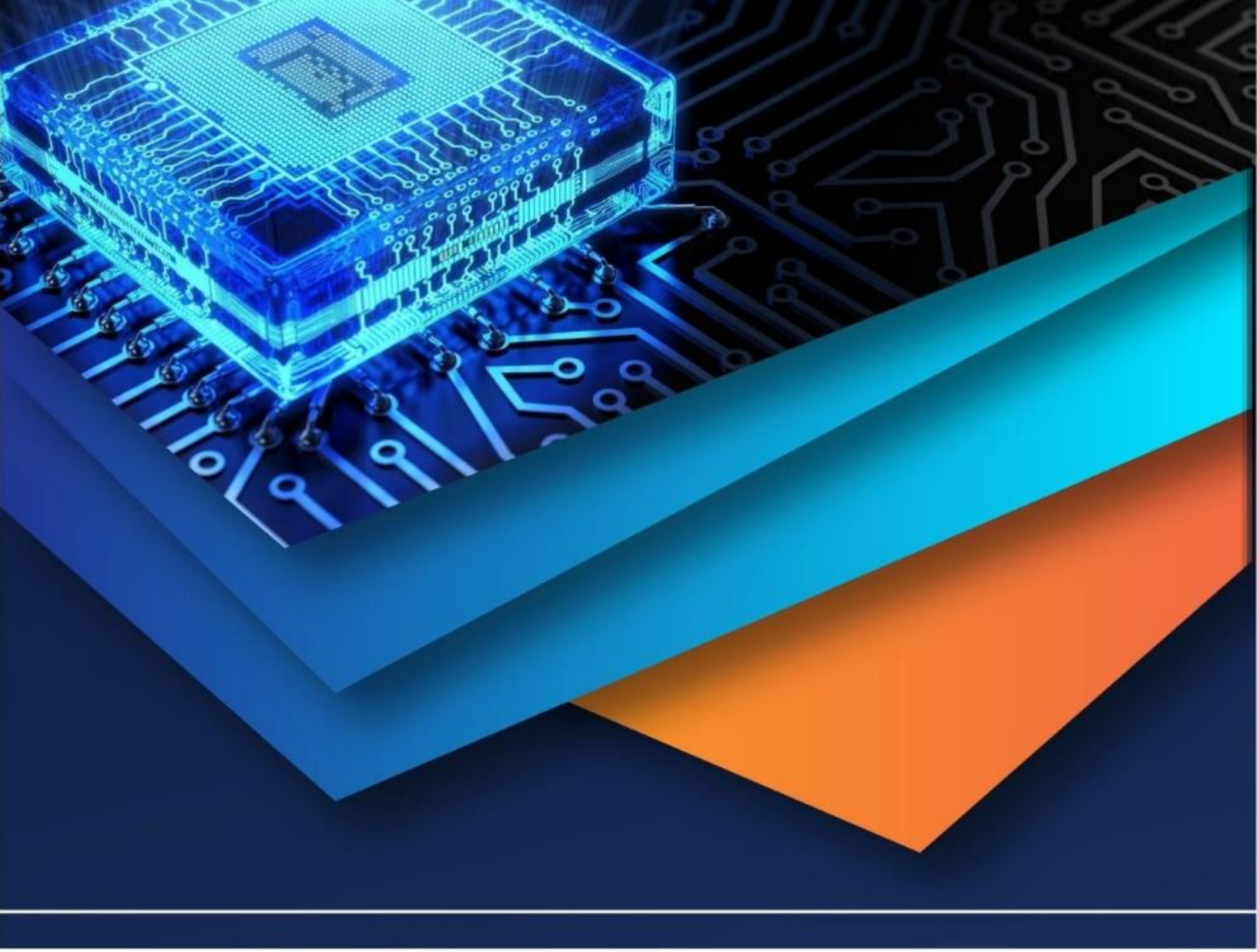
Fig 8.4 : Display Records from database

IX. CONCLUSIONS

The proposed system, which we will design, will be able to deliver on expectations and adhere to specifications, making it a top system for identifying and detecting criminal activity. This method provides a more reliable means of identifying criminals. Future results can be enhanced by using advanced face recognition algorithms, and a login page must be developed so that any police personnel can utilize this application remotely. Additionally, if a criminal is found in a specified region, alert messages should be issued to nearby police stations. The developed application is simple to use and appealing. Using machine learning technologies has made it much simpler to find connections and patterns between disparate data sets. The main goal of this study is to identify the kind of crime that might occur given the place where it has already happened.

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