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Criminal Detection Through Facial Recognition Using Deep Learning

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Abstract

Crimes are at rise and becoming difficult for police to identify and catch the criminals. This increasing crime rate can be reduced by giving alert to the person before its occurrence. Our Proposed System will use Face Recognition Algorithms to detect Criminals and will also use face expressions detection to detect expressions of the person. Face Recognition and Face Expression begins with extracting the coordinates of features such as width of mouth, width of eyes, pupil, and compare the result with the measurements stored in the database and return the closest record (facial metrics).The system will be running in detection mode [i.e scanning].If a person is feeling uncomfortable with people surrounded by him/her, can scan their face and find out whether that particular person has any crime record or not.

Keywords: Criminal dataset, Face recognition, Detection, CNN, Haar Cascade.

Introduction

Criminal record contains personal information about a particular person along with photograph. To identify any criminal we need identification regarding that person One of the applications is face identification. The face is our primary focus of attention in social intercourse playing a major role in conveying identity and emotion. Although it is difficult to infer intelligence or character from facial appearance, the human ability to remember and recognize faces is remarkable. Our aim, was to develop a system that can be used by police or investigation department to recognize criminal from their faces.

The method of face recognition used is fast, robust, reasonably simple and accurate with a relatively simple and easy to understand algorithms and technique. This application also helps to maintain records of criminals, one can also find all the details of the criminal in our application. To develop an application which will serve a way to register and track criminals remotely with the help of criminaldata.

data. Criminal identification is the most important task for the Police who are finding the criminals, but it is the difficult and most time-consuming task as they have to find it everywhere. It will be more difficult in cities or public places with high people density.

Related Work

The survey that is conducted comprises the most recent developments and research on the subject of our project. It is an endeavor to comprehend the work that has gone into this area of research and to identify the areas where our project-development efforts should be concentrated. As the crime rate and criminals are increasing day by 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.

1. Creating Criminal Database : The first main task is to create a local database which consist of the images of the criminal. This pictorial data will be required to identify or match the identity captured in the image. This data set is created by either the user or by the officials with the help of a program. Program will generate a 20 samples of the images and will store in given address.

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Fig.6. Database images which are saved in a special folder when criminal found

2. Generation of a file for the storage of

Criminal records: A python program is built which will capture the image and it will store the captured image at the given location of the file in the operating system. Firstly, the path of the file is generated using os.path.join (image-dir, name). If there is no such file exists then it will create a new file with the given name. Haar cascade frontal face detection algorithm is used to capture the image of face accurately from a live feed. Secondly, web camera or pie camera will be started and it will take the given number of samples (images) and store it in the file.

3. Registering new criminal: This is the first step of implementing face detection as the criminal face with id, name, age, gender and crime committed is registered to the database. The data are collected in SQL Studio that gets converted into the .db format. (b) Each face is given a unique ID, as the faces are recognized using the ID by the program.

4.Face Detection Once the image is received the model checks the presence or absence of face in the image. Once face is detected its location is localized and only face image is extracted.

5. Preprocessing Images Processing the features that are to be extracted, for improving the rate of recognizing the face. The facial image is cropped and is resized at lesser pixel value. Ascertain images contain disturbances it will be hard to train in LBPH, results in the inaccurate histogram. For this reason, the prepossessed image is normalized to get theuniform grey level and filtered to extract the preprocessed image.

6. Feature Extraction: Feature-based approaches first process the input image to identify and extract (and measure) distinctive facial features such as the eyes, mouth, nose, etc., as well as other marks, and then compute the geometric relationships among those facial points, thus reducing the input facial image to a vector of geometric features.

7. Neural Networks for face recognition: Face recognition with deep neural networks or convolutional neural networks is a very popular technique today. This method gives the higher accuracy and precision comparing the previous methods. This method is used in Facebook's DeepFace and Google's FaceNet. Also, there is an open source project called openface, which provide a python based API for face recognition. The idea to generate embeddings using convolutional neural network was invented in 2005. There are lots of other research about producing embeddings using convolutional neural network. Such as Visual Geometry Group (VGG) Face Descriptor and Lightened Convolutional Neural Networks (CNNs), and they have their won implemented system. To training a neural network for generating embedding, lots of face data is necessary. Facebook, Google has their own dataset. Openface also releases some trained neural network by training it with some open facial dataset.

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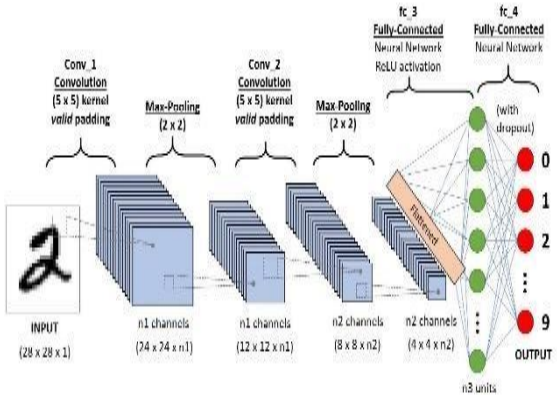


Fig 3.2: Convolutional Neural Network

4 .DESIGN

The system is careful analysis has been identified to be presented with the following modules:

a.) Admin

This module will be responsible for adding the criminals in the database, training the system and managing the system.

b.) User

This module will store the information of the user. It will also store the information of volunteer. In case of emergency the user information is retrieved form the module and send to emergency module.

c.) Criminal Detection

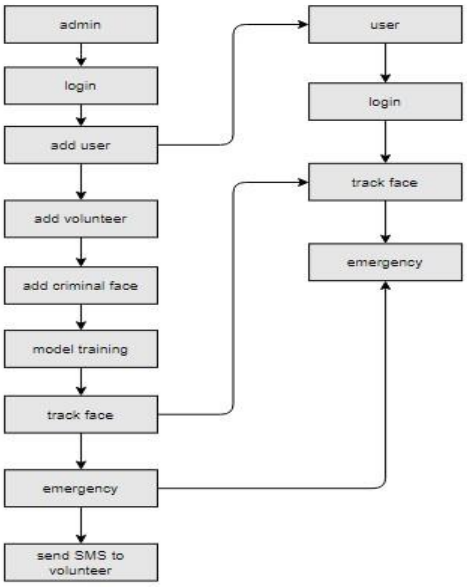
This module will be responsible for detecting whether the person in front of the camera is criminal or not and showing Details.

d.) Face Expression Recognition

This module will recognize the facial expression of the person in camera view and will alert the user if anything seems wrong.

e.) Image sharing and alert

This module will be responsible for sharing Image of suspect and Location of the user in case an Emergency Button is pressed.



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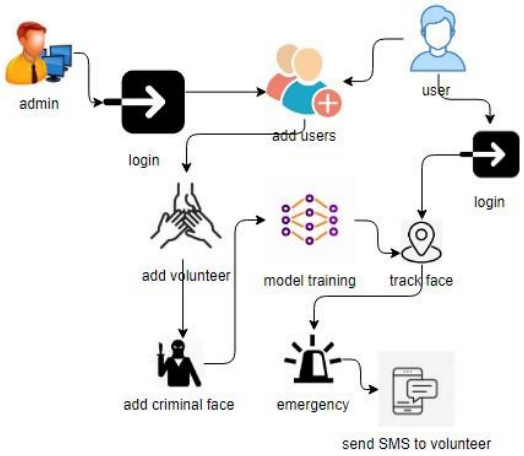
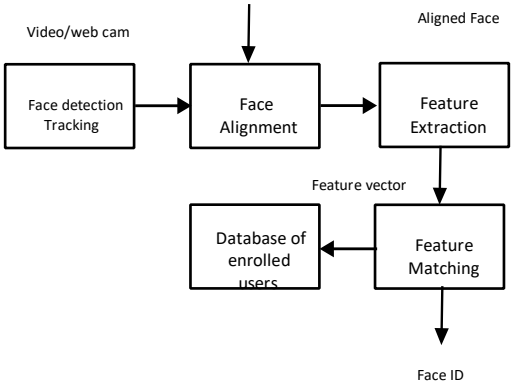


Fig: Architecture Diagram

4. Result:

The criminal face identification is implemented by extracting the face from image, identify the face. The face is searched in the database to look for the details about the criminal. If the information about the face is not available user is prompted to add/update description about the face to the database



5. Conclusion:

This upgraded version of the criminal detecting system not only provides a huge convenience to the police in the identification of criminals but also saves time for them as the processes are implemented in the system criminal detection through facial recognition is essential to identify criminals and to detect a suspect and also prevents the occurrence of incident in public place. For future work, we can add the Alarms to the criminal detection system. It will range only when matches are found so that if anyone is not there to keep watch in the CCTV room, they will come to know that someone is found from the database in that public place.

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