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RESEARCH ARTICLE

ANDROID APPLICATION FOR CRIMINAL FACE IDENTIFICATION USING RESTAPI

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ABSTRACT

The world, we are living around where androids and information technology have become a major part of our daily stuff. And as we know the crime rates are increasing day by day, this is due to the criminals are moving free around us. We need to keep track of the criminal records and must be able to recognize the criminal at any time. With the help of existing technology and human resources can build a quality life around us. This allows us to take steps towards implementing smart, safe cities, by using the personal mobile devices and social networks to make the people alert and aware of their surroundings Hence we are developing an android application which provides not an indication but also surveillance of the crime to the police and for the welfare of the society through an android application. This application has a function like real-time face recognition using Open CV, posting a crime incident (record crime) or we can see the recent news or notification given by the police department to the app. If we consider a particular situation about the working of an app, a particular person found fighting or showing any abnormal activity. Then a police officer can capture the image of the face of person and upload it to the server, if the record is identified or recognized, the particular criminal is search in the database of our server, all this we can perform using getting and posting request to our server, here we have used the local host RestAPI. This System is able to detect the face, which can help police to track people.

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INTRODUCTION

As we can see that crime is increasing day by day and at a very high rate as one new crime diminished the older one. In another words we can state that one crime buries many as in our country there are countless crimes and no records on the files. Hence, we can have different opinions among us, among our ideologies. There is an abnormal increase of such unhealthy, unethical incidents and also the number of criminals is also increasing, this is really a serious issue and we need to take concern about the security issues. Crime preventions and criminal identifications are the primary aspects before the concerning authority but having the limited police force lead us to the second thought. The criminals are moving around us. In order to keep track of the criminal's record and use them in efficient manner, we have developed the Android application which can identify the criminals and show all related criminal records. Which may help police to quick identification of criminals. The face is crucial for human identity. It is the feature which best distinguishes a person. This is one of the way to reduce crime in the country. This can reduce the attacks planned by the international most wanted criminals. Technology can be used in many fields like mobile technology, messaging, E-mail, gaming and so on.

It is very crucial job to police to get the right information on time through their walkie-talkie. Recently there was an android application Vic PD which was launched by the Victoria police in the Canada for people safety. Also, another proposed system is crime area detection and criminal data record in which the system recording crime and giving alternate routes to user as soon as user enters in the particular area but this system failed to indicate a crimes location to the user by google map. This paper proposes an android application which is developed for the crime awareness among the people and about their safety. This system is basically divided into two parts such as an android application for user and database to keep records of the criminals. We have shown the necessary information like height, weight, Complexion, crimes, etc, which future help police to identify the criminals most accurately. An android application has a function like search the crime, post the crime, search safety places and some emergency numbers. The local police stations have all the rights to add, remove and modify the records in the database, accordance with the department. The android app has one more new functionality which was not there in previous systems is that somewhere if recently the crime is happened and the area is declared as the high alert then the user can share this scenario with all the other0 users and it is verified by the local police officials and has some basic functionality

like Authentication. We have used the RestAPI using the Flask which post and get the request from the Face-Recognition model. And SQL-lite for altering the database for the records of the criminals.

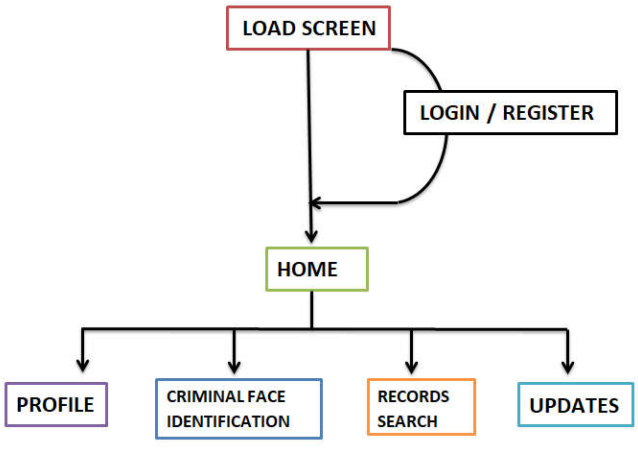
Literature Survey

In the present situation, the Android Application are the important portion for the daily lives of the people. If we add the features like Face recognition, it will help people to identify the people in easier way. The best way to get the information about Open CV libraries, API's, Android Application we actually use the Research Papers, Documentation, and articles. We have mentioned some of them. In the Researches (1,2), it is described that the actual implementation of the algorithms developed on the Dlib and Open CV Libraries. It also shows the comparison between the various Face Recognition Algorithms developed, in which the Open CV library is more productive in Face Detection and Recognition. If there is plenty of Images in the Dataset the use of Haar Cascade Classifier is more efficient. In the Research (3) the paper proposes the mobile application for the Age, Gender and Face identification using the OpenCV Libraries. A LBP face features Library classifier was used for the face detection and LBPH model was used for face recognition. In Researches (4,7), the Face Recognition system was developed for the Criminal Face identification, the Haar cascade classifier was been implemented. And on the another paper the Face recognition model was been developed on the Raspberry Pi. (5,6) the researcher proposed the Face Recognition system developed on the CCTV cameras, using Machine Learning model. However, the use of Face Recognition Model directly on the mobile device requires more processing power, that why we have used the API's which reduces the processing on the mobile devices, application works faster and can be used to low processing power devices.

METHODOLOGY

In this paper we have made the Android Application for the Police, has featured like login and register, profile- we can edit the profile, Database of the SQLite for criminal records, Criminal Face Identification, and many more. We will be seeing them in further.

Work-Flow



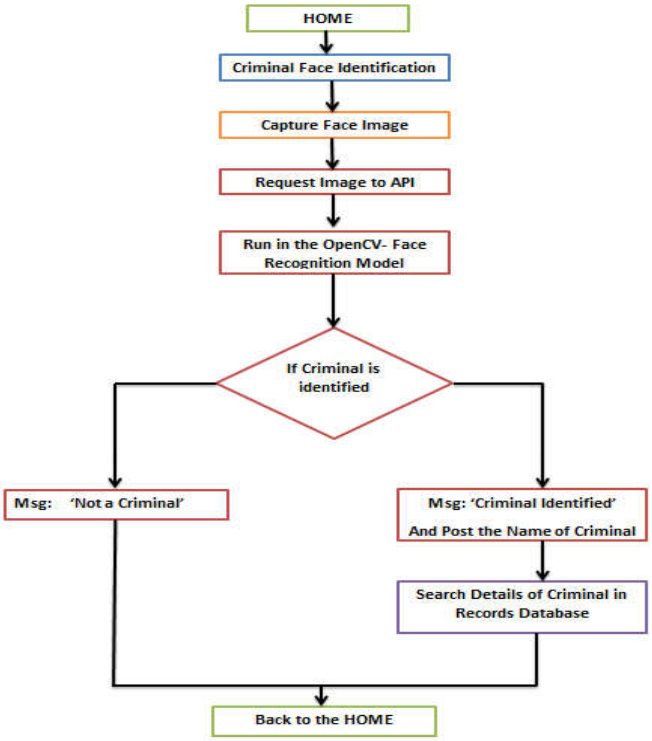
When the police officer will open the Application. The load screen will be visible, if the Application is already installed and registered then the police user will be directed to the home screen. If the user installs the app newly then the user can login / register to the Application, later user will be directed to the home screen. In-home Screen the user has features like current update, profile, criminal face recognition, record searching.

Login, Profile and Update Screens

We have made this Application on the Android Studio. Android Studio is the official IDE made by Google for the development of Android Applications. we have use the Firebase- Authentication for the Login and Register Screen. In which the Authentication using Email and Password is used. By this we can keep track of the user. In Profile Screen, we have used the Firebase- Storage. In which the user profile image, name, phone- number, department, area, and police-id is stored. And on the Update Screen we have used the web-page, on which the department can post any important updates or instructions.

Criminal Record

We have used the SQLite Database; it is the SQL database system. It is the Relational Database, which stores the data to the text file in the device. Android Studio comes with the built-in SQLite database, and it is very easier to implement. We have used the three tables criminal, department, crime_info. Department table and Crime_info table are connected with the Criminal table. The attributes of the Criminal table are criminal_id, name, dept_id, incharge, crime_sr_no, date, place, punishment, status, description. The attributes for the Department tables are dept_id, incharge, dept_name, incharge_date_join. The attributes for the Crime_info table are crime_sr_no, crime, rating, punishment_in_record.



In the record screen, the user has to enter the criminal_id or name of the criminal. And the details of the criminal will be displayed (if it ispresent in the records). This can help police to fetch the user data.

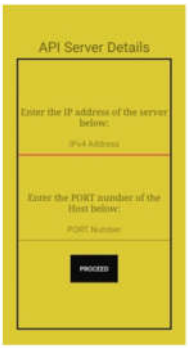
Criminal Face Identification

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 makeover 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. Firstly, the user will capture the image of Face, then he can upload image (means he is sending the request to the API). The API request the Image to the model. 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 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. haar cascade frontal face default.xml is used for detecting the face. Cascade is loaded using the cv2 Cascade Classifier function which takes the path to the cascade XML file. if the XML file is in the current working directory, then the relative path is used. Once the Face is identified it is searched in the Record Database. By these users can get the required information about criminals.

The steps involve 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. OpenCV currently provides Eigenface Recognizer, Fisherface Recognizer, and Local Binary Patterns Histograms(LBPH) Face Recognizer. We have used the 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 grey scale transformations. To create the function to prepare the training set, we will define a function that takes the absolute path to the image database as an input argument and returns a tuple of 2 lists, one containing the detected faces and the other containing the corresponding label for that face. For example, if the i'th index in the list of faces represents the 4th individual in the database, then the corresponding i'th location in the list of labels has a 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. For API we have used the Flask RESTfull API's, REST architecture was originally designed to fit the HTTP protocol that the world wide web uses. We have kept our OpenCV Face Recognition model on the Local Host of our PC. Whenever the request come, the HTTP requests handled in Android using OkHttp and the model gives result.

RESULT AND DISCUSSION

The user of the application will first post request to the API. If the Criminal is identified, then the API will post the name of the identified criminal to the Android Application. Later the name will be searched in the record Database using SQLite. As we are using the RestAPI, firstly we have to give IPV4 Adress and Port number (used for hosting the server) of oyr PC. The Camera window will appear, we have used the wonderklin camera. We have to capture image and upload request to the server, if the Criminal is identified it will give the lable of the image. According to the Lable, the name is searched in the records and the basic information like name, type of criminal, and status (Active / Inactive) is shown.For the smooth working of this application and to improve it's efficiency we would be taking the database from the server of the cops. Whenever any new criminal is identified his details will be provided to the proxy network and app will show it so that all the people become aware of it.



As there are other conventional methods of criminal identification, mobile application is a new field, it has huge impact on ease of work and is still under research. Mobile application for criminal identification has faced variety of challenges to the fact that mobile devices have unique features like , limited range of bandwidth, unreliable networks and many more. The compatibility of Android application depends on its ease of use, that will be done if there is proper UI built. The UI is coded in the XML and made much more comfortable to the user. The mobile application is tested on different versions of Android to check the compatibility level.

Conclusion and future Enhancesment: The proposed Android Application for Criminal Face Identification is based on the OpenCV Face- Recognition and Flask RESTfull API. We have used the SQLite for the Criminal Record Database. Even if we input the different facial image than the images present in the dataset, the model is able to recognise the face. As many images we put in the dataset the more efficient is the model. The application of mobile technology in crime prevention and is still a new in the field. The mobile application platform provides us a more convenient way for organizing new records, to provide services to large number of users. However, there is need to train an individual police officers and public users on the usage of the android application. There is still room for future enhancements on the android application and hence room for future researchers to improve on the current version of mobile android application

and the back-end server system. The Future Enhancement we can do is provide the well organised server. As we know that the RESTfull API works only if the PC is turned on and connected with the network, this is just for demo purpose. In order to implementation of project in day-to-day life we have to develop the proper servlet with Database included in it. And also we can add more features which can helpful ease of access, make job easier and reduce the crime.

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