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Criminal face recognition using video surveillance

Prasad Laxman Salokhe

oprasadls.15cs@saividya.ac.in

Sai Vidya Institute of Technology, Bengaluru, Karnataka

Ravi Raj

raviraj.15cs@saividya.ac.in

Sai Vidya Institute of Technology, Bengaluru, Karnataka

Sampreet U. Gaonkar

sampreetug.15cs@saividya.ac.in

Sai Vidya Institute of Technology, Bengaluru, Karnataka

Shalini

shalini.15cs@saividya.ac.in

Sai Vidya Institute of Technology, Bengaluru, Karnataka

ABSTRACT

Due to a rise in criminal activities, the identification of the criminals takes a lot of time even if the person is a recidivist. To identify and track missing or trafficked people the time taken to identify and save them may very well be greater before the person disappears again. To overcome this we propose a system that is highly reliable to recognize these people using face recognition techniques to recognize them anywhere in real time using CCTV or other video provided device so that actions could be taken more quickly. We move the whole system to the cloud so that the pictures of these individuals can be uploaded to train the face recognition model and can be used by many law agencies. The pictures can be uploaded from a local computer that is connected to the model on cloud and the database will be updated by adding the uploaded pictures. The processing also takes place in the cloud hence reduces the load on the local computer and only the results are sent back. Our proposed system yields much better processing and response speed and results in centralizing the whole data which can be updated and used by anyone without lowering the local system's performance.

Keywords— Face recognition, Machine learning model

1. INTRODUCTION

In a survey conducted by NCRB in Delhi showed that the number of people arrested for criminal activities, 17% of them were a recidivist and these numbers continue to grow each year. The investigation and identification of the criminals may take from a few weeks to months. The missing people who are kidnapped and trafficked are also very hard to locate and when located the retrieval of these individuals also takes much time which may lead to failure in their rescue. We propose a new improved system of face recognition to identify these criminals and missing people. Face recognition is the technique to identify the identity of an individual by the use of an image or video. Face recognition is a technology that is able to breathe a new life in today's law enforcement process and techniques. The face recognition systems were first designed in the late 1990s and are being upgraded each year to stabilize and give a more accurate

reading. The face recognition system used by the respective law agencies usually resides on a single local computer which can only be used by an expert. When an incident occurs the pictures are first extracted from videos then matched against their database and if not matched the match it against different databases of different law agencies. We propose a system that is able to change the current identification process of the criminals and the human trafficked victims by recognizing the individual in real time using live footage so that responders can take actions according to the situation. Our system can be used by anyone and results in much better speed and response than the current system is based upon. To achieve this we use cloud computing. Cloud is a server that is located in a remote place from which we can utilize its processing and storing capabilities without using our own resources. Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

2. RELATED WORK

There are a lot of models that can be used to recognize an individual. Some of them are Eigen Faces face recognizer, Fisher Faces recognizer, Local Binary Pattern Histograms (LBPH) and more. We use the LBPH model in our system as it is the most robust model when compared to Eigen faces and Fisher faces a model when it comes to illuminations and noise interference.

The current process of identifying an individual is to take the footage from the recording of the incident after it happens, compare it with the data present in different databases of different agencies which takes a lot of time and resources which is a boon for the criminals to prepare against the law enforcement's investigation. The program needs to be installed on a local computer which has a database of its own. To do a deeper search they have to access the databases of different agencies which takes a lot of time as the data isn't centralized. The load on the computer increases with there is an increase in the number of people to identify. If the computers fail and get damaged the whole setup needs to be moved to a different computer which is a very time consuming and redundant work.

3. SYSTEM MODEL

The system that we propose consists of creating a centralized database of these criminals and human trafficked victims. The whole program will be hosted on the cloud so that any law agency can access it. Even beginners can use a simplified system without any prior knowledge. We take the live feed from the CCTV and run our program on it so that it recognizes the criminals or victims in real time and an alert can be sent to the respective law agency which saves a lot of investigation time and reduces the response time from these agencies. The flow chart and the system design are given below:

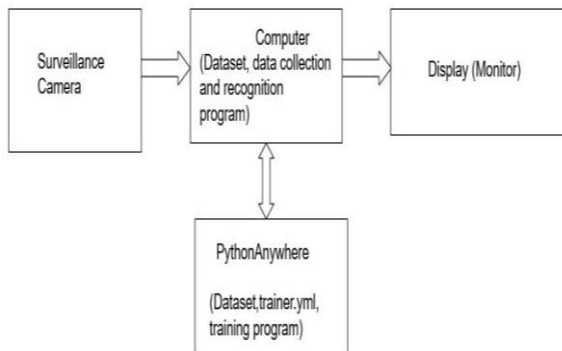


Fig. 1: System architecture

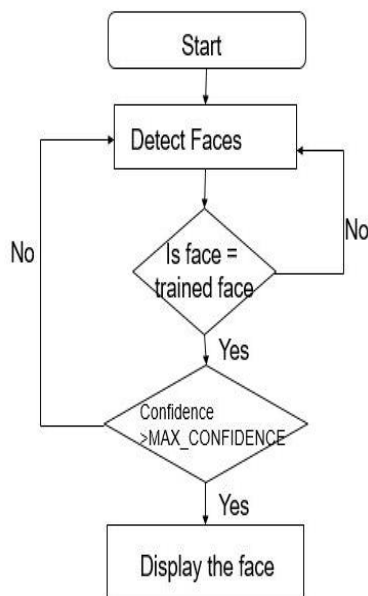


Fig. 2: System flowchart

4. PROBLEM STATEMENT

Detecting and alerting the concerned law enforcement department about the person of interest whenever they are caught by the video surveillance camera in real time.

5. SOLUTION

5.1 Collection of data

The first step is to collect the data and give each person an id. The images will be cropped and converted to grayscale which reduces the size of the dataset. The dataset thus created will be uploaded to Python Anywhere.

5.2 Training the model

A machine learning model using the LBPH algorithm will be trained every time the dataset is uploaded on the servers of Python Anywhere. It will greatly reduce the strain on the local computer. This will also enable us to use it on single board computers.

5.3 Detection and recognition

It uses OpenCV to detect the face from the live stream of the surveillance camera. The faces will be matched against the trained model dataset obtained from the cloud to recognize and find the confidence in percentage.

6. ANALYSIS

The model is centralized unlike other facial recognition mode and it is trained on the cloud. The strain on the local computer is vastly reduced as the data is trained on the cloud and many other remote computers with limited resources can use this trained data from the cloud and perform the recognition with ease. It can handle large face dataset. It can also process multiple faces and identify them simultaneously in a single frame.

7. CONCLUSIONS

Unlike other already existing facial recognition techniques used by law enforcement, this system can detect and recognize any person of interest in real time. As the training phase is hosted on the cloud it is also centralized and anyone who has access can use the yml file generated after training the model can be used to recognize the recidivists. This data can be used to convict the criminals in the court of law. It will also be able to detect the missing person if they are ever caught by the surveillance camera. It will be a great tool that can be added to the crowd monitoring arsenal.

8. ACKNOWLEDGEMENT

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