Criminal Face Detection Using Machine Learning-A Project Report

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Abstract: Criminal Face Detection project aims to build a automated Criminal Face Detection system by levering the human ability to recall minute facial details. Identification of criminals at the scene of a crime can be achieved in many ways like fingerprinting, DNA matching or eye witness accounts. Out of these methods eye witness accounts are preferred because it stands scrutiny in court and it is a cost effective method. It is possible that witnesses to a crime have seen the criminal though in most cases it may not be possible to completely see the face of the perpetrator. The Criminal Face Detection System will be built of an existing criminal database. Input would be provided in the form of sketch or an image and matched against the existing database and results would be provided. Criminal record generally contains personal information about particular person along with photograph.   This project is aimed to identify the criminals in any investigation department. Perhaps one of the most well-known applications of facial recognition technology is law enforcement, where we can use it to find missing people, aid in solving crimes and help monitor large crowds of people.

Keywords: DNA , Facial Recognition

I.   INTRODUCTION

The idea of the project has been taken from the TV Series named PERSON OF INTEREST which is an American science fiction crime drama television series in which a computer system were developed for the U.S. government named "THE MACHINE" that is capable of collating all sources of information to predict and identify— in advance—people planning terrorist acts. As an artificial super intelligence, its objective is to predict and prevent imminent terrorist attacks and does so by analysing immense amounts of surveillance data. The Machine sorts through all available information and categorizes persons of interest into relevant (national security risk) and irrelevant (ordinary risk) cases. It categorizes each POI based on their actions to determine whether they are the victim or the perpetrator.

It uses various machine learning techniques to determine the identity, location, and intentions of monitored persons by infiltrating domestic organizations such as the National Security Agency and foreign agencies including Interpol ("No Good Deed") to analyse their databases and data from various sources such as video footage, phone calls (landline, VOIP, mobile), GPS, electronic transactions, e-mail, social media, etc. The Machine was created with the ability to simulate the outcomes of different scenarios to aid it in making choices and to better fulfil its purpose. Finch taught it to how to play chess and the importance of making good decisions. It can evaluate the outcomes of different strategies by way of simulating them. In a mere fraction of a second, the Machine can create and process thousands of highly detailed, highly accurate simulations.

II.   RELATED WORK

Human face recognition systems use unique mathematical patterns to store biometric data. Hence, they are among the safest and most effective identification methods in biometric technology. Facial data can be anonymized and kept private to reduce the risk of unauthorized access.

III.   METHODOLOGY

Facial recognition uses computer-generated filters to transform face images into numerical expressions that can be compared to determine their similarity. These filters are usually generated by using deep "learning," which uses artificial neural networks to process data.

IV.   MODULES

1.Registration:

This is the first step of implementing criminal identification where criminal has to be registered to the database. The details of criminal involve id, name, crime details and the photograph of criminal. This face can be used for identifying the criminal captured through the surveillance camera.
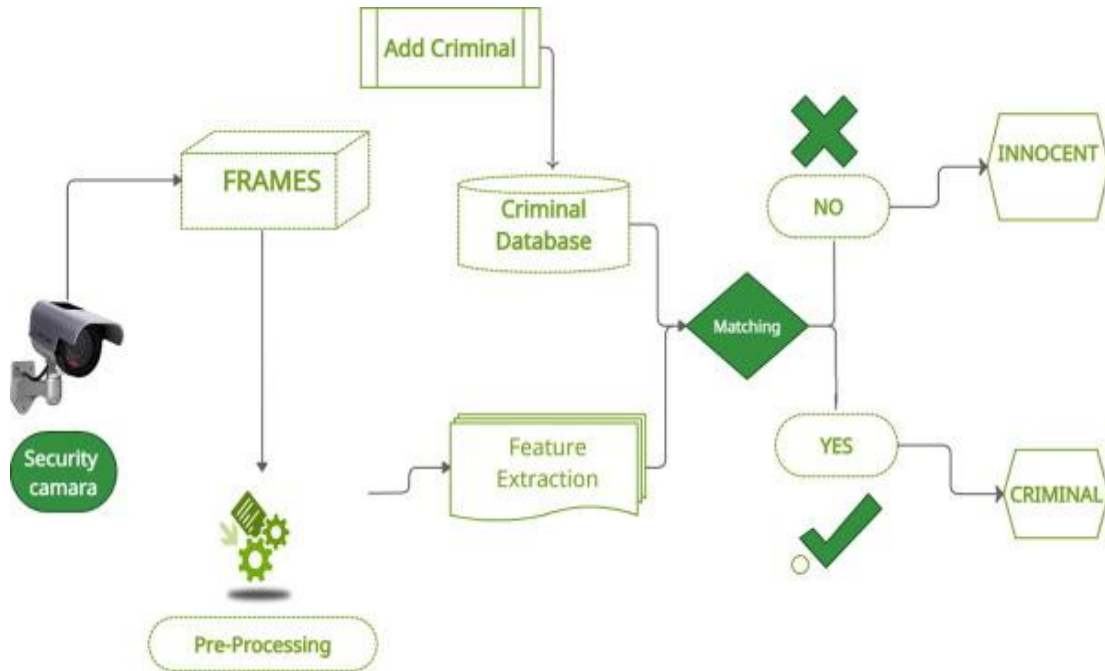
2.Face detection:

The video captured from the surveillance camera are converted into frames. In this frames the model checks the presence or absence of face in the image. Once face is detected its location is localized and only the face image is extracted.
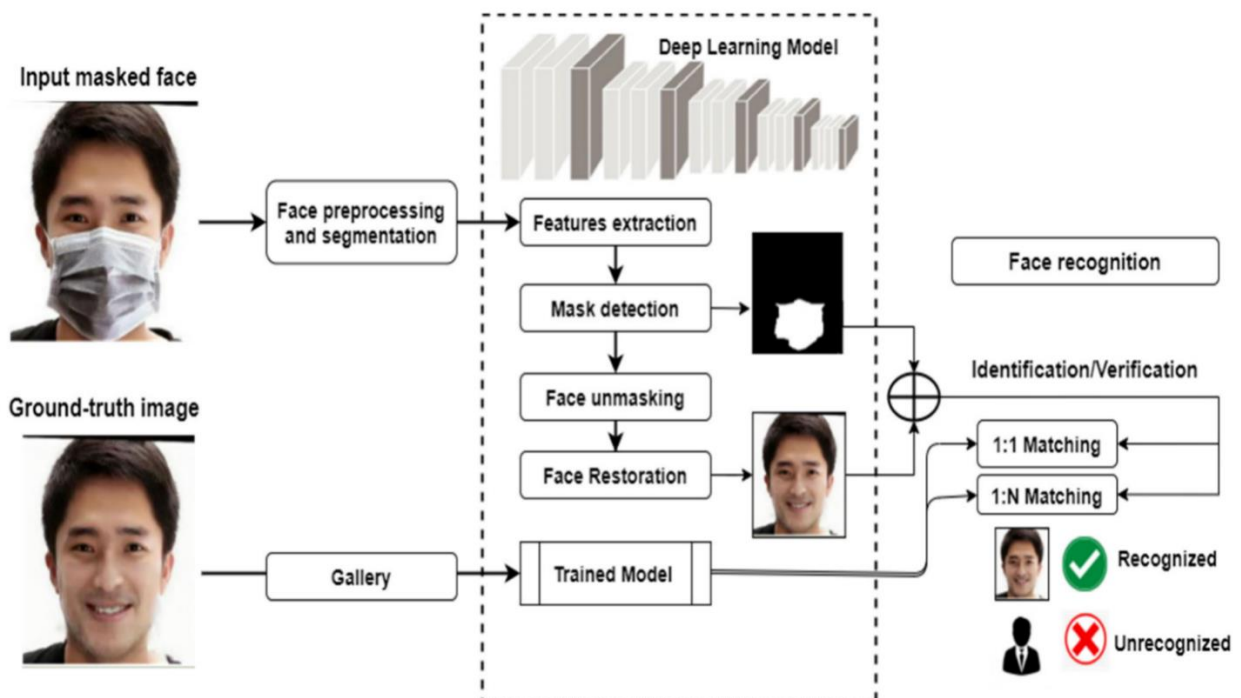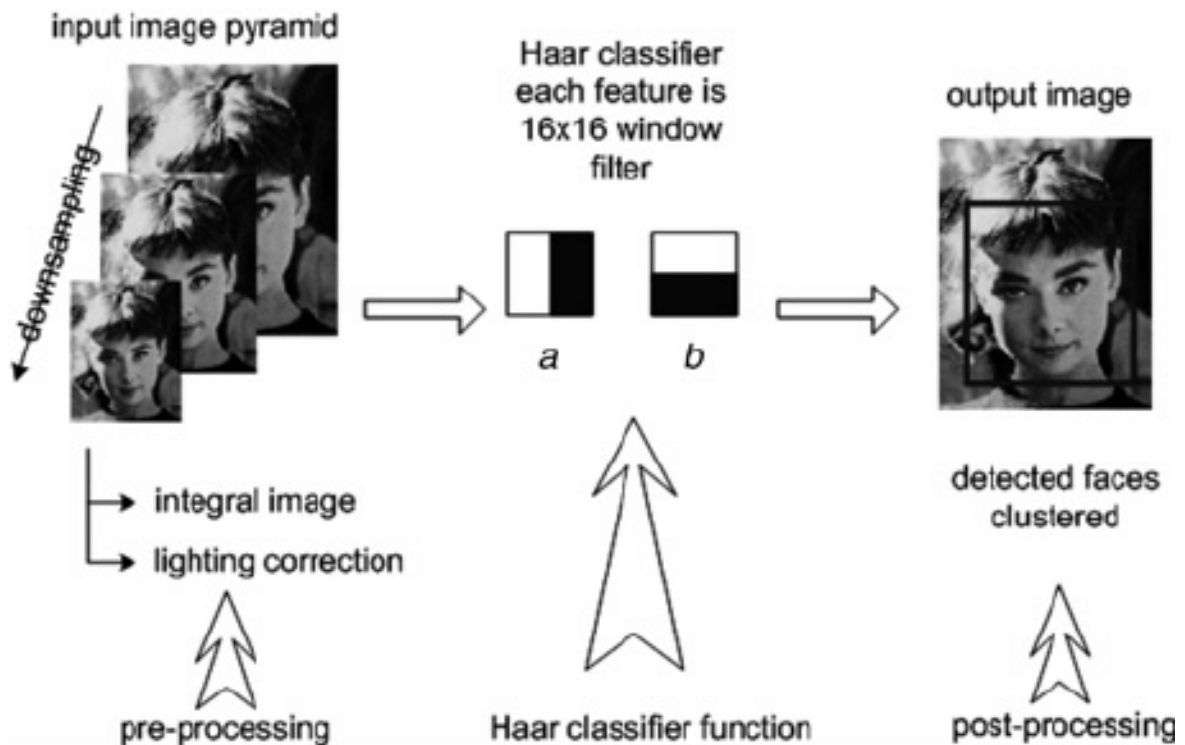
3.Preprocessing Images:

The aim of pre-processing is an improvement of the image data that suppresses undesirable distortions or enhances some image features significant for further processing. In this step the features that are to be extracted are processed, for improving the rate of recognizing the face.


4.Feature extraction:

When a face is detected in a frame, it is pre-processed and then it goes through feature extraction. The performance of the entire system depends on this step. Different facial features are extracted using the Haar cascade classifier.


5.Open CV:

Open CV is the vast open-source library for the computer vision, machine learning, and image processing and plays a major role in real-time operation which is very important in today's systems. Through Open CV, one can process images and videos to identify objects, faces, or even handwriting of a human. Open Source Computer Vision Library is a library of programming functions aimed at real-time computer vision. Classifier provides the differences between positive and negative image where the positive image is for face and the negative image is for non-face image. Open CV trains the classifier on any chosen face as set in the program and provides pre-trained and ready for implementing face detection classifier.
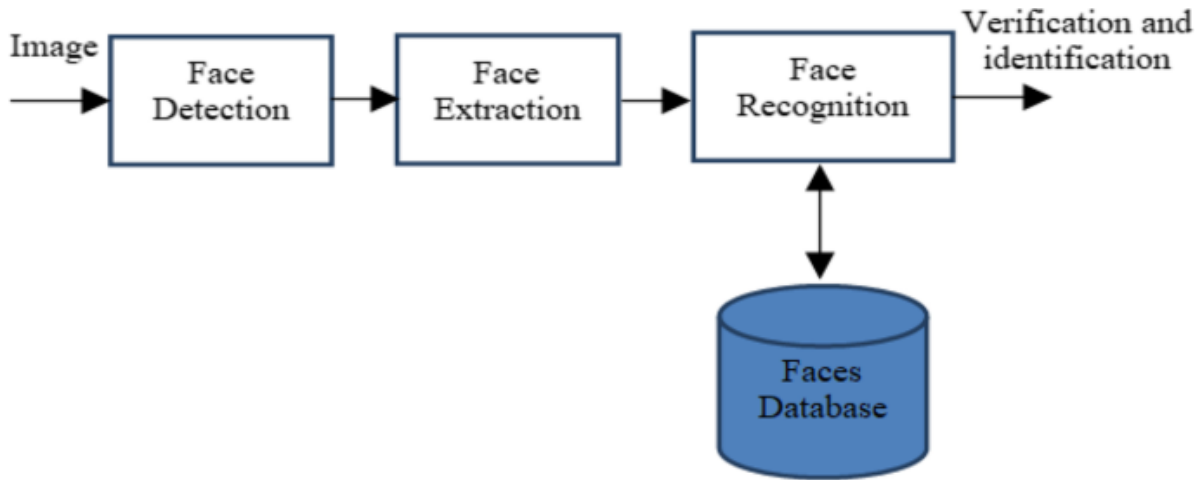
6.Classification:

The features of the processed real-time image are compared with the features of images which are stored in the criminal database. Classification is performed using Haar Cascade Classifier.
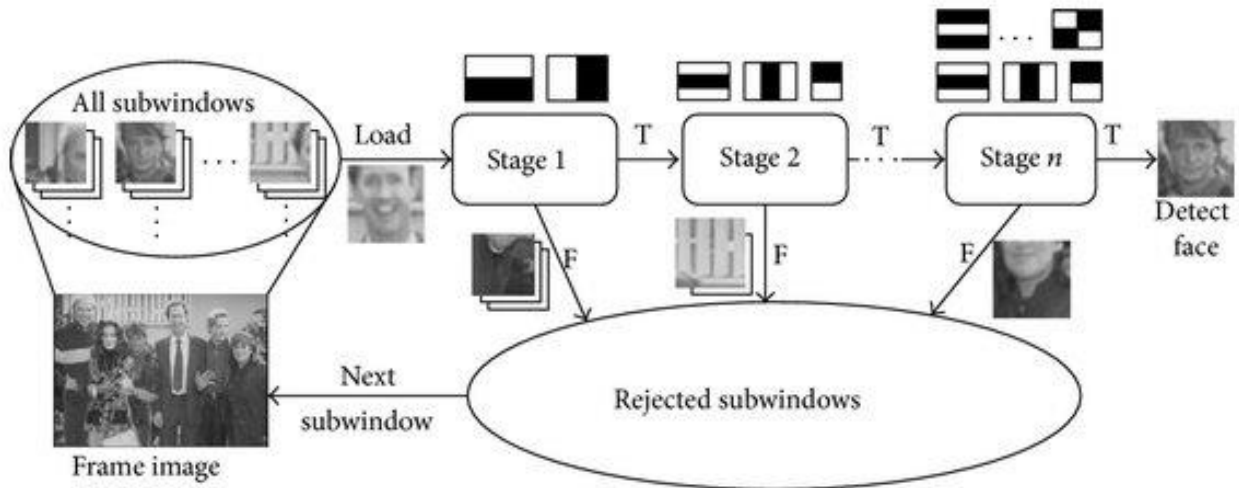
7.Notification:

If a match is found between the real time image and database image of a criminal, an alert message along with the location and real time image of the criminal would be sent to the authority. From this details the police can further track the criminal.
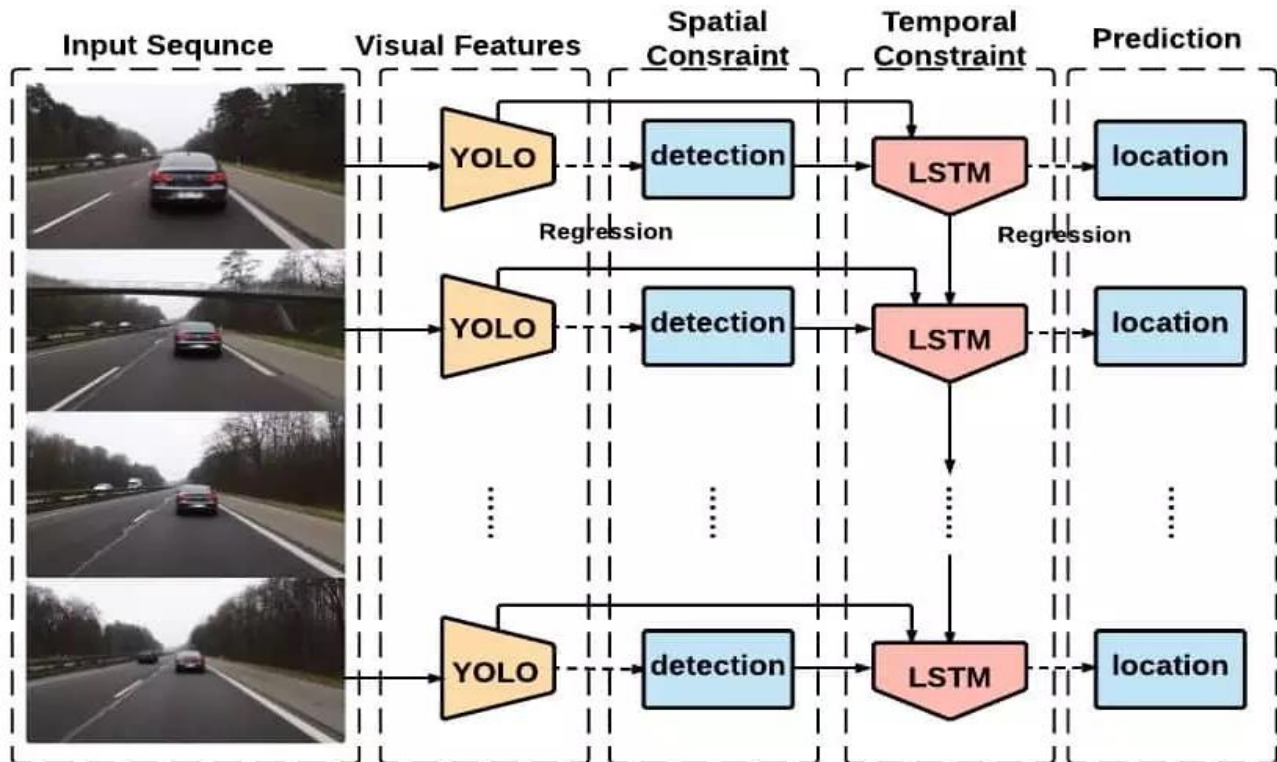
V. EXPERIMENTAL RESULTS

The face images which are used in experiment are based on different varieties including changes in pose and facial details and variability in expressions. This end is achieved using the ORL face database. The database consists of 35 individual and corresponding 350 images. All images in the ORL database is considered for experiment purpose. The performance measure is based on accuracy of face recognition

VI. 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 processes are automated in the system. The novelty of this Research Paper is face detection done by using Face Encodings.

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