Automatic Face Recognition and Detection For Criminal Identification Using Machine Learning

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ABSTRACT

The number of offenders and the rate of crime are both abnormally rising, which raises serious concerns regarding security issues. As protecting property and lives is the police's major priority, crime prevention and criminal identification are the most pressing challenges facing the officers. Nevertheless, there are not enough officers available to fight crime. Since the development of security technology, many public and private spaces now have cameras, particularly CCTV, placed for monitoring purposes. Suspects at the scene can be recognised using the CCTV video. In this project, a machine learning algorithm is used to create a face detection and recognition system for criminal identification. This technology will be able to distinguish offenders' faces in real-time and automatically detect their faces. The one shot learning technique used by this system would likewise just need a single photograph of the culprit to identify him. A message is sent to the police staff with all the facts and the position where he was being watched by the camera. The purpose is to identify the criminal face, get the information held in the database for the identified criminal, and identify the criminal.

Keyword : - *Criminal Identification; CCTV; facial recognition; Haar classifier; real-time; Harr cascade features; OpenCV*

1. INTRODUCTION

One of the most difficult problems in computer vision nowadays is face recognition. Applications for it include everything from websites for entertainment to security and monitoring. Facial recognition software is useful for consumer screening at banks, airports, and other establishments. Face recognition technology for Automated Passport Control has been implemented at crossings and customs in Germany and Australia. The human face is a dynamic entity with a high degree of visual diversity, making face detection a challenging task in computer vision. Accuracy and speed of identification are major problems in this discipline. Facial recognition faces several difficulties.

Humans who modify their facial characteristics by donning coloured contact lenses, growing a beard, heavily applying makeup, etc. might compromise the system's resilience.

Concerns over ethics also arise while seeing, learning, and identifying faces. Many people disagree with the use of surveillance equipment that repeatedly picture persons without their consent.

This study aims to assess face detection and recognition methods and offer a comprehensive solution for image-based face detection and recognition with improved accuracy and reaction times as well as a first step in video surveillance. On the basis of experiments on several face-rich datasets in terms of individuals, stance, emotions, and light, a solution is suggested.

2. LITREATURE SURVEY

- Kranthi Kumar a, , Y. Kasi Viswanadham a , D.V.S.N.V. Indira a , Pushpa Priyanka palesetti b , Ch.V. Bhargavi c et.al. This technology will be able to distinguish offenders' faces in real-time and automatically detect their faces. The one-shot learning method used by this system would likewise just need a single photograph of the perpetrator to identify him. The goal is to recognise the criminal face, extract the information from the database for the recognised criminal, and send a notification to the law enforcement officials with all the information and the place where he was being watched by the camera.

- Ajay Gurav, Alireza Chevelwalla, Sachin Desai, Prof. Sumitra Sadhukhan et.al. The objective of this work is to assess face recognition and detection methods and to offer a comprehensive solution for image-based face identification and detection with improved accuracy and reaction rates as well as a first step for video surveillance. On the basis of experiments on several face-rich datasets in terms of individuals, stance, emotions, and light, a solution is suggested. A systematic approach to identifying crime hotspots is crime analysis. The identified crime regions, which are mostly based on crime type, are useful in lowering the crime rate. Finding high-crime regions may be done quite simply, and the crime rate can then be examined.

- Ruchi Jayaswal; Mansih Dixit et.al. The traditional approach is the first, while the deep learning method using real-time data is the second. The accuracy of the models on the same dataset will be determined after comparing these approaches with various algorithms, and it will be determined whether or not they correctly predict a face. In a community where there is peace, an increase in crime rates is always cause for concern. Publicly accessible information and services, together with advancements in information technology, somehow assist criminals in carrying out their misdeeds and entangling them in more serious crimes than before. As a result, both developed and underdeveloped countries are experiencing extraordinarily rapid increases in crime.

- Souhail Bakkali; Muhammad Muzzamil Luqman; Zuheng Ming; Jean- Christophe Burie et.al. We examine three cutting-edge face identification techniques based on general pictures, namely Cascade-CNN, MTCNN, and PCN, for face detection in camera-captured photos of identity papers, given varying image quality assessments, in order to more effectively handle this issue. Several banking industries use data mining tools for customer segmentation and productivity, credit ratings and authorisation, payment default prediction, advertising, spotting bogus transactions, etc. This study provides a broad overview of the relationship between data mining techniques and various cybercrimes in banking applications. Also, it offers a thorough study of effective and worthwhile data mining approaches for the analysis of cybercrime data.

3. COMPARISON OF RELATED WORK

Police officers face a significant challenge in monitoring, locating, and tracking criminals as the crime rate and the number of offenders rise daily. There are programmes that can assist the police department store information about criminals, but they cannot be used to track down the offenders themselves. The major methods used to manage criminal information were record books or software records kept in databases. In the past, when a criminal is found guilty, their photo is taken and kept in records, but these pictures have no use. The currently used techniques merely aid in maintaining criminal records; they do not aid in tracking down offenders anywhere. In our research, a face recognition system utilizing the Harr Cascade analyzes a new image to a database of existing photographs to see whether there is a match. Identification of each facial picture is possible utilizing the RGB values for the eye color, the breadth and height of the face, as well as a variety of ratios.

4. Methodologies:

Harr Cascade Algorithm: Classifiers using the Haar Cascade algorithm are useful for detecting objects. The classifier is trained using a large number of both positive and negative pictures in the Haar Cascade technique, which is based on machine learning.

Positive images: These pictures show the kinds of things we want our students to recognise.
Negative images:This are pictures of everything else that don't include the thing we're trying to find. We'll utilise the Haar Cascade classifier to put our use case into practise.
In order to better grasp these Haar Cascade Classifiers, let's attempt. This method essentially uses machine learning, where a cascade function is learned using a large number of both positive and negative pictures. It is then used to detect the things in the other photos based on the training. These are large individual.xml files with several feature sets, and each.xml relates to a very unique kind of use case, which is how this works. In this use-case, we'll utilise the haarcascadefrontalfacedefault.xml to try to identify people's faces. We scaled down the image because it was too huge for the dimensions we used here.

The Criminal Identification System application's home page. It has buttons for video surveillance, criminal detection, and criminal registration.
The user will be prompted to choose one image of the criminal who needs to be registered on the criminal registration page. The page also offers an input form for the criminal's name, address, gender, age, email, password, username, and other data. The user will click register after choosing photographs and entering their information. If there are no errors, the offender will be successfully recorded.
Create Face data: The user can capture a criminal's facial data from the system on this page. It will be saved in a folder with a specific ID and added to the database.
Train Face Data: Train the complete facesdata in the folder using LBPH Recognizer.
Person Identification: Camera will get open and person will get identified. And details will get display on screen.

SYSTEM ARCHITECTURE

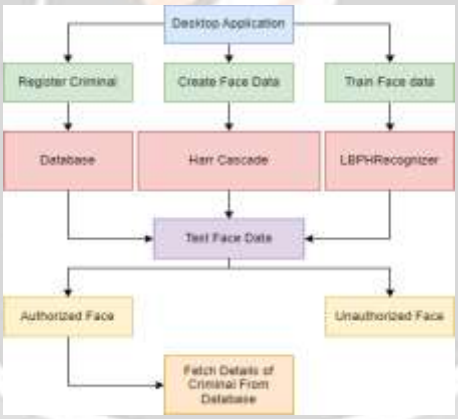

Fig 1. System Architecture

5. CONCLUSION

In this study, we are able to identify and detect offenders' faces in a real-time video stream and image taken from a camera. For face identification in the OpenCV technique, we employed cascade classifiers based on Haar features. Using machine learning, a cascade function is learned using a large number of both positive and negative pictures. The next step is to utilise it to find items in other pictures. Also, for face recognition, we employed Local Binary Patterns Histograms (LBPH). This algorithm has a number of benefits, including: effectively choosing features Instead of scaling the image itself, we scale the features in the scale and location invariant detector. A general detection method like this may be trained to detect different kinds of objects (e.g. cars, sign boards, number plates etc). Faces may be accurately recognised by the LBPH recognizer in a variety of lighting situations. Moreover, LBPH can detect accurately even when just one training image is utilised for each individual. The following are some drawbacks of our application: The detector only works well with frontal pictures of faces; it has difficulty coping with a 45° rotation of the face around both the vertical and horizontal axes.

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