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Finding Missing Person Using Machine Learning (Criminal Identification)

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Abstract: *In practise, fingerprint identification is used to identify criminals in Malaysia. However, this method of identification is limited because most criminals nowadays are becoming more adept at avoiding leaving their thumbprint on the scene. Cameras, particularly CCTV cameras, have been put in numerous public and private spaces to provide surveillance operations since the emergence of security technology. CCTV footage can be used to identify suspects on the scene. The law, however, enforces thumbprint identification due to restricted software designed to automatically detect the similarities between photos in the tape and recorded photos of criminals. An automatic facial recognition system for criminal databases was proposed in this study using the well-known Python programming language. This technology will be able to automatically detect and recognise faces. If there is no thumbprint on the scene, this will aid law enforcement in detecting or recognising the suspect.*

Keywords: Criminal Identification, Face Recognition, Python

I. INTRODUCTION

Face recognition is one of the rare biometric technologies that combines accuracy with minimal intrusiveness. Face recognition has piqued the interest of academics in domains ranging from security to image processing to computer vision since the early 1970s. Face recognition has also proven beneficial in the analysis of multimedia data. The aim of face recognition is to recognise a previously detected object as a known or unknown face. The problems of face recognition and face detection are frequently conflated. On the other hand, to determine if the face belongs to a recognised or unknown person, a database of faces is used to validate the input face. The main goal of this project is to use a Neural Network to construct an efficient architecture for facial identification when playing videos. This product includes two self-contained Neural Networks (CNNs) for detecting and recognising faces in regions with a dense collection of features from the Accelerated Segment Test (FAST). Identifying whether the image of a person's face matches any of the face images contained in a database. Due of the changes that numerous elements, such as facial expression, ageing, and even lighting, can cause on the image, this problem is difficult to handle automatically. Although facial recognition is not the most trustworthy of the biometric approaches, it offers significant advantages over the others[2]. It's utilised in a variety of applications, including security and access control, forensic medicine, police controls, and attendance management systems. The following are some of the different approaches for marking a person: 1) System based on signatures 2) System based on fingerprints 3) Recognition of the iris 4) System based on RFID 5) Recognition of faces Face Recognition, among the approaches mentioned above, is natural, simple to apply, and does not require the test subject's assistance. It consists of a set of connected tasks that are solved in order: 1. To take a picture and identify all of the people in it. 2. Focus on one face at a time, and remember that even if a face is twisted in an unusual way or lit poorly, it is still the same person. 3. Identify numerous identifying elements of the face that can assist in recognising it from the faces of others. These traits could include the size of the eyes, nose, face length, skin colour, and so on. 4. To figure out the person's name, compare these distinguishing aspects of that face to all the faces of people we already know. As a human, our brain is designed to execute all of this naturally and instantly. Because computers are incapable of such high-level generalisation, each stage of face recognition must be taught or programmed separately. There are two types of face recognition systems: verification and identification. Face verification is a 1:1 match that compares a face image to a template face image that is being used to verify someone's identification. Face identification, on the other hand, is a 1:N issue that compares two query face images.

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II. Related Work

1. Mayuri S. Takore, Pallavi R.Wankhade, February 2015

Criminal Face Identification System Along with an image, a criminal record frequently contains personal information about an explicit individual. To catch a criminal, we'll need certain information about the person provided by the viewer. The standard and backbone of most recorded image segments are poor, making it difficult to distinguish a face. To overcome this disadvantage, we usually develop code. Fingerprints, eyes, DNA, and other methods of identification can be used. Face recognition is one of the most common uses. In social interactions, the face is our primary centre of attention, and it plays an important role in transmitting identity and producing mood. Though the capacity to infer intelligence or character from a person's face is dubious, the human ability to recognise a face is remarkable.

2. Nurul Azma Abdullah, Md. Jamri Saidi, Nurul Hidayah Ab Rahman, Chuah ChaiWen, and Isredza Rahmi A. Hamid, Face Recognition for Criminal Identification

Associate Degree implementation of principal component analysis for face recognition, The second International Conference on Applied Science and Technology 2017 In this paper, an automatic face recognition system for criminal info was proposed using known Principal Component Analysis approach. This technique are going to be ready to discover face and recognize face automatically. This can facilitate the law enforcements to detect or recognize suspect of the case if no thumbprint present on the scene. The results show that about 80.

3. E-Crime Detection using Face Recognition System 8616 Volume three, Issue 2 April 2014.

The proposed system will be used to detect criminals at a variety of security locations, such as airports and railway stations. A video camera records a series of frames of a person approaching a sign on a counter. The proposed method matches the acquired images captured by the camera with the images of criminals kept in a database. Face identification using Hear Based Cascade classifier and recognition using Principle Component Analysis with Eigen Face are the two stages of the proposed system. The purpose is to create the system (model) for a specific face and identify it from a large number of previously stored faces with certain time changes.

4. Prarthana Sandip Patil, Pournima Paman Patel, Snehal Prakash Sonar, Chaudhari Vrushali Kishor, Crime Identification using 3-D Face Recognition, International Journal of Emerging Technologies in Engineering Research, 2018.

The objective of this paper is to assess confront discovery and acknowledgment procedures and provides a complete image based mostly face location and acknowledgment with higher truth, higher reaction rate associated an underlying advance for video observation. Arrangement is planned in light of performed tests on totally different face made databases as so much as subjects, stance, feelings and light.

5. Ashutosh Chandra Bhensle, Rohit Raja, An Efficient Face Recognition using PCA and Euclidean Distance Classification, IJCSMC, 2014.

Person identification by face is a difficult and time-consuming process. The ability to recognise a person from an arbitrary perspective is critical for security and access control. Recognition of a given face could be valuable in a variety of situations, such as person-computer interface, criminal detection, and so on. Because of the larger dimensionality, the current approach requires additional calculations and is no longer effective. Rather than using high-speciality face vectors, it is preferable to employ lower-speciality face vectors. Face detection from films recorded from a distance and web cams is easy and comparably simple with this forced face recognition technique. Face expressions are removed from the revised PCA rule, and classification is done via minimal distance classification.

6. Orthogonality Loss: Learning Discriminative Representations for Face Recognition Shanming Yang, Weihong Deng, Mei Wang, Junping Du, Jiani Hu DOI 10.1109/TCSVT.2020.3021128

In this paper, from a different perspective, we consider enlarging the inter-class variance by directly penalizing weight vectors of last fully connected layer, which represent the center of classes. To the end, we propose Orthogonality loss as an elegant penalty item appends to common classification loss to learn the discriminative representations. The main idea is that

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in order for weight vectors to be discriminative, it should be as close as possible to be orthogonal to each other in the vector space. More specifically, the optimization objective of Orthogonality loss is the first moment and second moment of cosine similarity of weight vectors. We performed the empirical studies through simulating the long-tail datasets to show the generalization ability of the proposed approach on long-tail distribution datasets. Further, extensive experiments on large-scale face recognition benchmarks including the Labeled Face in the Wild (LFW), the IARPA Janus Benchmark A (IJB-A), IJB-B, IJB-C, MegaFace Challenge 1 (MF1) and MS-Celeb-1M Low-shot Learning demonstrated that Orthogonality loss outperforms strong baselines, which showcases the extensive suitability and effectiveness of Orthogonality loss.

III. PROPOSED SYSTEM

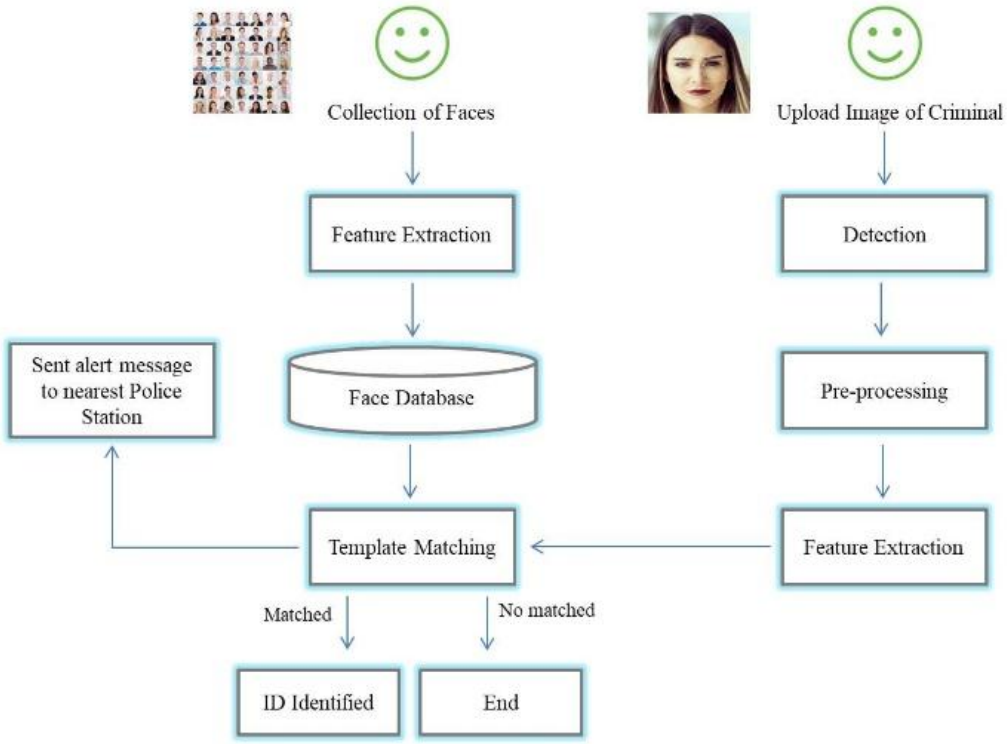

Figure: Proposed System

IV. ALGORITHM

K-mean Clustering Algorithm
Input: K- the number of clusters
Dataset: a data set containing n objects
Output: A set of k clusters
Step 1: Randomly select k data objects from dataset D as initial cluster centers.
Step 2: Repeat
Step 3: Calculate the distance between each data object di (1 ¡= i ¡= n) and all k cluster centers cj (1 ¡= j ¡= k) and assign data object di to the nearest cluster.
Step 4: For each cluster j (1¡=j¡=k), recalculate the cluster center.
Step 5: Until no changing in the center of clusters.
The computational complexity of the algorithm is O(nkt)
where, n: the total number of objects
k: the number of clusters
t: the number of iterations

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V. RESULTS

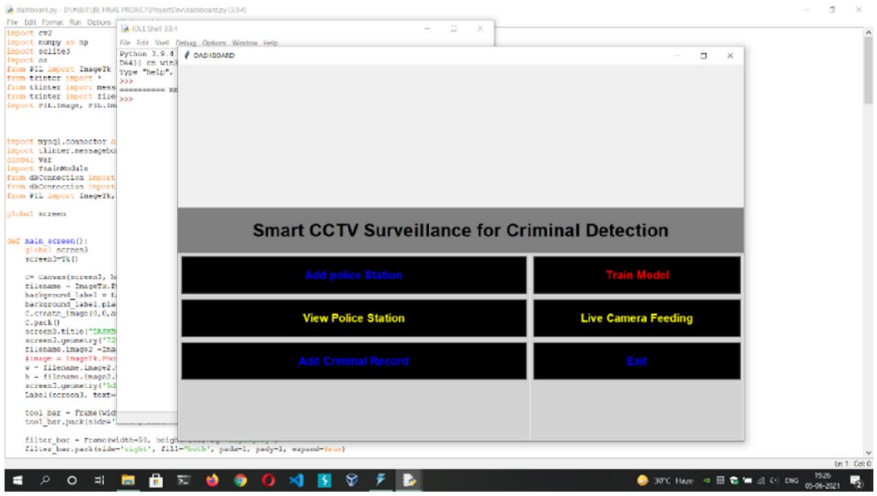

Figure: Dashboard

Figure: Add Police Station

VI. CONCLUSION

We have developed a criminal identification system. It will save you time and effort, especially if you are going somewhere sociable. The goal of the Automated Criminal Identification Approach is to eliminate the flaws in the traditional (manual) system. This system exemplifies how image processing techniques can be used in public spaces. This technology has the potential to not only assist in criminal investigations, but also to improve the government's reputation.

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