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Prison Surveillance System an AI Based Criminal Monitoring and Court Tracking Platform

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Since, there is extremely less information and utilization of Facial Recognition System for security observation in India. This system proposes a framework that will utilize Facial Recognition to track or look through an objective individual from a continuous video feed, similar to an image from a reconnaissance framework. Right off the bat, the system is furnished with a Live Video film of the zone that must be examined. At that point, it is given information, an informational collection of pictures of a focused-on individual, for instance, a missing individual, criminal, and so on.

When the info is given the system will remove a predefined set of facial attributes from the Input Dataset and make a preparation module that will help in looking through the individual from the ongoing video film. In the event that a match is discovered, the system will distinguish and check the individual.

Likewise, one of the principal goals of this undertaking is to build up the previously mentioned framework related to the current Surveillance framework for example to make it good with the now introduced reconnaissance cameras in order to keep the expenses and bother of running it at least.

Introduction

Prison Reform initiatives have a grim picture during the last two or more decades, most of the recommendations of Mullah Committee on prison reforms are yet to be implemented. It is an established fact that center and state government has made allocations for prison reform in areas like infrastructure development, providing legislative & judicial remedies. But building new prisons, introducing provisions like 436 & 436A, the fast track courts, Lok Adalat is like curing symptoms not the disease. Therefore, it has become imperative that these initiatives needed to be assessed to set right our future strategies for prison reform initiatives.

The purpose of this study is to analyze the process of prison reforms undertaken by the department of prisons and correctional services, Uttar Pradesh. It attempts to provide an elaborate and systematic analysis of prison reforms undertaken by the prison administration. The above problem has been discussed in context of institutional decay, the institutional capacity building & administrative reforms- to device appropriate response for the factors contributing to this decaying process. It also highlights that the policy makers at institutional and governmental level must assess the inputs, strategies, outcomes and viability of these capacity building/ reform measures. The review of Literature and discourse I, II, III brings us to the central contention that the crux of the central problem- that most of recommendation of prison reforms being unimplemented-is disharmony between Penal Philosophy, Administrative Mechanisms and Stakeholders support.

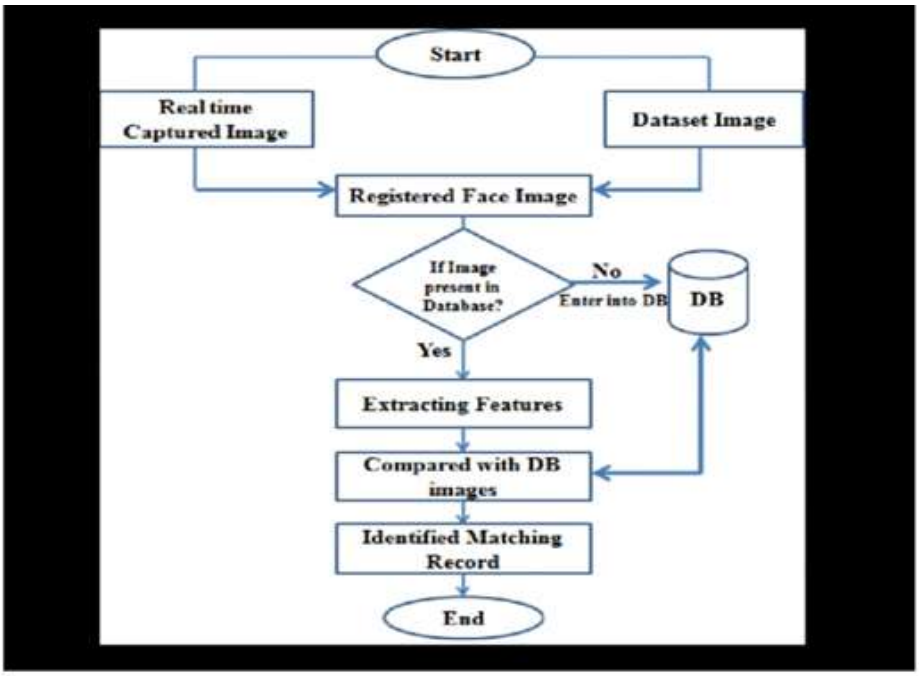
Identifying Trilogy: -

At the present time, the AI technology of facial recognition is comprehensively being applied for surveillance. It helps in detecting individuals or groups that need close surveillance, usually for lawful cause.AI Facial Recognition Technology can identify criminals at the scene of an event if we add. It can further help in recognizing those criminals who roam free. In another way, it can be a great example of the identification process. factor to make the cities safer. This technology makes possible monitoring of real-time data. It does so by capturing an image or video and then analyzes it and identifies it.

Tracking Forces: -

The police forces in order to track a criminal from a crowded area can use this technology to a greater effect. First, they need to feed an image of the crime doer into the AI-powered surveillance system. The cameras that scan all the area of the city are brought into play. The cameras would be analyzing and comparing all the faces that it detects. An alert goes off if the surveillance finds any match in the crowd. The police officers can reach the exact spot and apprehend the criminal. The police forces are adopting AI facial recognition which would enable tracking criminals in a less laborious way.

Real-time facial recognition boasts the incredible potential to prevent crime. As there are considerable advancements involving this technology, it is gradually beginning to extend. To perform accurately this new tracking solution must have access to a wide range of databases. And these data should comprise varied faces and settings. The data must have faces of all diverse skin textures, being captured from different angles and in various lighting environments. All these can make the algorithm very precise.



Flow Chart

Related Work/Current Scenario (Literature Survey):-

Key goal of computer vision researchers is to create automated face recognition systems that can equal, and eventually surpass, human performance. Designing an AI-Based Facial Recognition system to Identify criminals and missing persons. The system allows the user to log in by using a username and password given default as "admin". The system allows the user to match the input image to be matched. The system provides a matching event if the input has more than 70% similarity with the image in the face database then the person in the image is matching. This system will help our Govt. agencies a lot, Save their time and energy**.** To this end, it is imperative that computational researchers know of the key findings from experimental studies of face recognition [1]. These findings provide insights into the nature of cues that the human visual system relies upon for achieving its impressive performance and serve as the building blocks for efforts to artificially emulate these abilities. The face recognition problem has been studied for more than two decades. The approaches proposed in the literature so far can mainly be classified into two categories: model based and appearance based as described by Fu Jie Huang and Zhihua Zhou [5]. The model-based method tries to extract geometrical parameters measuring the facial parts while the appearance-based approach uses the intensity or intensity-derived parameters such as eigenfaces coefficients to recognize faces. Due to the changes of lighting condition, expression, occlusion, rotation, etc., the human face appearance could change considerably. There are existing approaches proposed to recognize faces under varying pose. One is the Active Appearance Model proposed by Cootes [5], which deforms a generic face model to fit with the input image and uses the control parameters as the feature vector to be fed to the classifier. The second approach is based on transforming an input image to the same pose as the stored prototypical faces and then using direct template matching to recognize faces, proposed by Beymer, Poggio and later extended byVetter [5]. The third method is the eigenspace from all of the different views, proposed by Murase and Nayar, and later used by Graham and Allinson in face recognition .

- **The Viola-Jones face detector**

The basic principle of the Viola-Jones algorithm is to scan a sub-window capable of detecting faces across a given input image as demonstrated by Ole Helvig Jensen [2]. The standard image processing approach would be to rescale the input image to different sizes and then run the fixed size detector through these images. This approach turns out to be rather time consuming due to the calculation of the different size images. Contrary to the standard approach Viola-Jones rescale the detector instead of the input image and run the detector many times, through the image – each time with a different size. At first one might suspect both approaches to be equally time consuming, but Viola-Jones have devised a scale invariant detector that requires the same number of calculations whatever the size. This detector is constructed using a so-called integral image and simple rectangular features reminiscent of Haar wavelets.

Image here

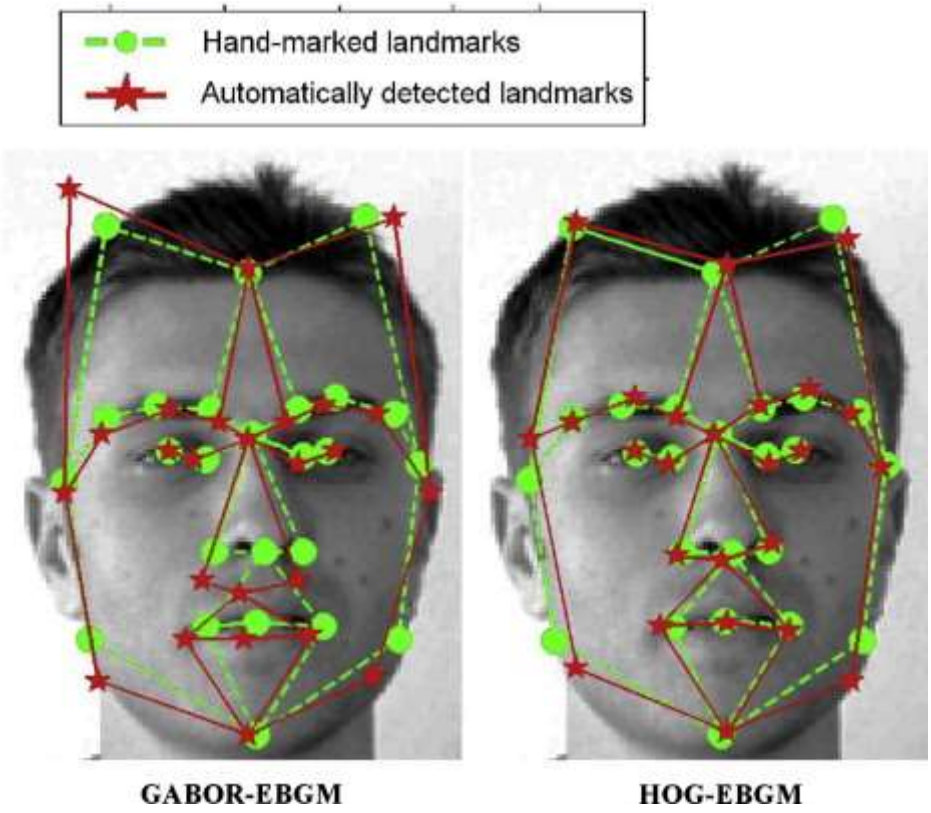
- **The scale invariant detector**

The first step of the Viola-Jones face detection algorithm is to turn the input image into an integral image. This is done by making each pixel equal to the entire sum of all pixels above and to the left of the concerned pixel. This allows for the calculation of the sum of all pixels inside any given rectangle using only four values. These values are the pixels in the integral image that coincide with the corners of the rectangle in the input image. The Viola-Jones face detector analyzes a given sub-window using features consisting of two or more rectangles. Each feature results in a single value which is

calculated by subtracting the sum of the white rectangle(s) from the sum of the black rectangle(s). Viola-Jones has empirically found that a detector with a base resolution of 24*24 pixels gives satisfactory results. When allowing for all possible sizes and positions of the features, a total of approximately 160.000 different features can then be constructed. Thus the amount of possible features vastly outnumber the 576 pixels contained in the detector at base resolution. Following images are Screenshots from our systems module that is Face Recognition along with the name of a corresponding face.

- **EBGM:**

EBGM relies on the concept that real face images have many nonlinear characteristics that are not addressed by the linear analysis methods discussed earlier, such as variations in illumination (outdoor lighting vs. indoor fluorescents), pose (standing straight vs. leaning over) and expression (smile vs. frown). A Gabor wavelet transform creates a dynamic link architecture that projects the face onto an elastic grid. The Gabor jet is a node on the elastic grid, notated by circles on the image below, which describes the behavior around given pixel. It is the result of a convolution of the image with a Gabor filter, which is used to detect shapes and to extract features using image processing.



GABOR-EBGM **HOG-EBGM**

Motivation: -

Since There is an Increment in Crime Over the years and the efficiency of the Security Services to maintain a hold over the Huge Chunk Population with malicious intentions and overclocking themselves in the process to do so is not providing results. So, with the Help of Rapid growth in Technology, Some (if not all) of the problems solving tasks can be designated to technology that can work with 100% Efficiency All around the clock.

Working Principle: -

Detection:

Facial detection is just the computer taking the seen face from the video as its input. This step involves detecting whether the image seen is a face or not by training the system with features like eyes, nose, and lips. The AI system is trained with sets of images that have faces in it and sets of images that do not have faces in it and conveying to it which are faces and which aren't. Some of the methods are eigenface-based, distribution based, neural networks, support vector machines, a sparse network of winnows, naïve Bayes classifiers, hidden Markov model and inductive learning, among others. All these methods work on the same general idea of identifying whether the image is a face or not.

Extraction

Face extraction involves noting down specific facial features after scanning it. If there is a large change in the entire scanning of the image, it saves it. Features like certain lines, corners, patches, moles and similar features like that are detected. Also, some distances like that between the eyes, nose length, the shape of eyebrows or cheekbones are recorded. It identifies over 80 nodal points on the human face and stores the resulting data as a faceprint.

Recognition:

This is the final step where the imposter or criminals are tracked down. This is where the face is matched with a name or an identity. Here, the system runs through all its pictures (or the passport picture in case of airport security) and tells whether the face matches or with whom does it match.

It also finds characteristics which best describe the image. Algorithms used in this step are eigenfaces, local binary patterns histogram (LBPH), fisher faces, scale invariant feature transform (SIFT) and speed up robust features (SURF), to name a few. All of these algorithms take the extracted image as the input and match it to get the true identity. The system does all of this within no time, saving a lot of time and efforts and providing accuracy at the same time.

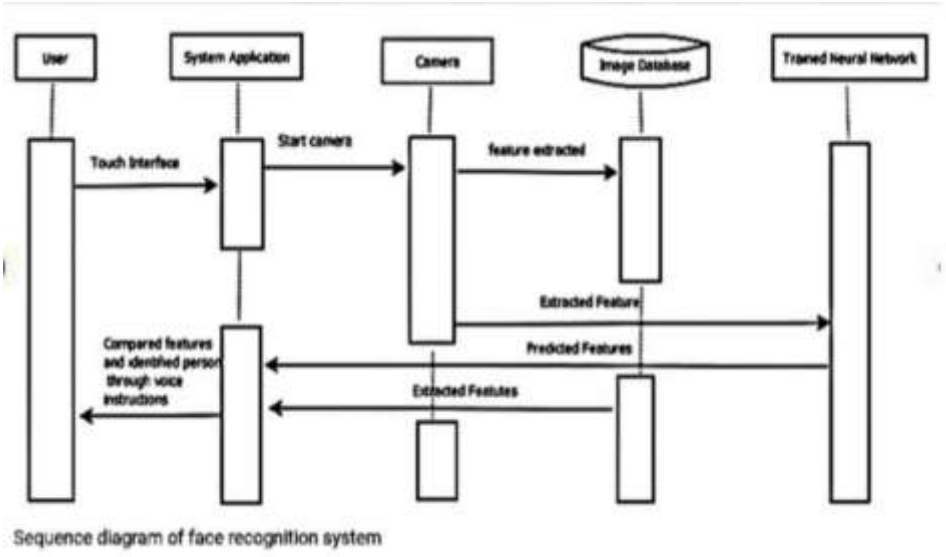
Planning:

1. Project initiation - a preliminary analysis is undertaken about how to collect face images to be used as the template to the system.
2. Project planning– determining the correct technique/ software to do the detection and recognition.
3. The system allows the user to log in by using username and password given default as “admin”.
4. The system allow user to input image to be matched.
5. The system allows image to be compared.
6. The system provide matching event if the input has more than 70% similarity with the image in the face database.
7. The non-functional requirements describe the RTFRCIMP’s security implementation that includes authentication by login, PCA and Eigenface algorithm.
8. System design defines the architecture, components, modules, interfaces and data for a system requirement.

Design/Model Diagram of The Platform

System design defines the architecture, components, modules, interfaces and data for a system requirement. Figure 4 presents the overall system design of Safe Heaven.

According to Figure, the first step is to create face databases as the match template for the system. A face database is created by acquiring collection of people photos. The photo should be half body photo where the face is facing front. In the process of verification of id for an image, the image which is captured using digital camera will be processed. The image will be detected and extracted and ready for the next stage. The next stage is pre-processing, where unnecessary features are eliminated. This is to reduce unnecessary processing effort. In the feature extraction, the images are collected from the database and represent it as a vector, then the algorithm will find the average face vector or the mean and it will subtract the mean face from each sample faces. All these photos then are processed using PCA procedures to get the Eigenface as the basis or standard features of human face. These features will be used in recognition phase where it tries to match with the correct image in the database. If matched, the identification of the image will be verified, else it will stop.



Sequence diagram of face recognition system

Implementation phase of Platform

It involves implementation on the interface and on the backend coding. The system interface was implemented using Microsoft Visual Studio while the backend components, which are database and coding, were implemented fully using MATLAB R2013b.

Function OutputName = Recognition(TestImage, m, A, Eigenfaces

Figure 5 shows the function OutputName for the purpose of recognizing the image. This function takes four parameters which are the TestImage, m, A, and Eigenfaces. TestImage is the input image which we want to find the matching image in the databases. m is the mean image in the database and A is the deviation of the images. Lastly, Eigenfaces are the Eigenvectors of the covariance matrix of the training database. Next is to project the image to be stored. The most The most important step in this system which is extracting necessary features for matching procedures is started.

Expected outcome

Briefly illustrate the outcomes of the project development along with the benefits to the society. The main function of project —image identification, was programmed with detection and extraction of image, projecting image and recognition of the image. The user needs to input the image for identification for the recognition process. Once the image is recognized, detected and extracted, all the necessary features are extracted for identification.

Conclusion

It has been certainly made out from the result and analysis that the proposed work has provided a better implementation of the current algorithms with integration of the modified work. The proposed system of tracking people in live video is just small part of the much larger picture. Compared to legacy systems, assay of facial expressions can help expedite a lot of manual labor that goes into the respective area of work, unnecessarily. Similar approach can be used to further develop system which detect crimes, identify.

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