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CRIMINAL FACIAL DETECTION AND OCCURRENCE PREDICTION USING DEEP LEARNING

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ABSTRACT:

Various recent advancements in deep learning models have greatly boosted the performance of semantic pattern recognition using images. Various state estimation of an individual like emotional state and other certain character features or traits can be estimated from the facial images. With this motivation, in this work we are attempting to infer criminal tendency or (crime prediction/detection) from facial images by using the learning capabilities of various deep learning architectures. More precisely two type of deep learning models we have used in this study: standard convolutional neural network(CNN) architecture and pre-trained CNN architectures, namely VGG-16, VGG-19, and InceptionV3. We have done a performance comparative analysis among these models for efficiently capturing criminal traits from a human face. The efficacy of the above deep learning models was evaluated on a public database, National Institute of Standards and Technology (NIST). To avoid any discrepancies, we have only used male images in this work. It was found that VGG CNN models are best performing models, especially in a limited data scenario producing the classification accuracy of 99.5% in identifying criminal faces. Index Terms—Image Classification, Facial images, Semantic pattern Recognition, Personality Traits, Deep Learning, Image Processing.

INTRODUCTION

- Biometrics is a technology that uses the unique patterns of physical or behavioural traits of human for authentication or identification. The advancement in biometric technology is bringing in the biometric scanners onto smartphones and other affordable devices. There is also an increasing number of services and applications that require high security and smooth customer experience. Biometric technology is replacing traditional authentication methods. One of the advanced methods of biometric is facial recognition.
- For identifying a person face is the decisive part of the human body. Face distinguishes a person. Facial recognition is a challenging problem that finds application for authentication in banking services, security systems, searching, identifying personal among others. A human can easily recognize the face, for the computer it requires an entirely different process. Face acknowledgement is an errand

that people perform routinely and easily in their day to day lives. The wide accessibility of amazing and minimal effort - work area and inserted registering frameworks has made a tremendous enthusiasm for programmers to prepare computerized pictures and recordings in various applications, including biometric confirmation, observation, human-PC association, and sight and sound administration. Innovative work in programmed face acknowledgement pursues normally. A face recognition system is expected to identify faces present in images and videos automatically. It can operate in either or both of two modes: face verification (or authentication), face identification (or recognition).Face check includes a coordinated match from grayscale image (black and white) against a format face (datasets) picture whose feature is being extracted. Face recognizable proof includes one-to-numerous matches that think about an inquiry face picture or video against all the format pictures in the database to decide if it matches. Another face acknowledgement situation includes a watch-list check, where an inquiry face is coordinated to a rundown of suspects (one-to-few matches). The research in facial recognition is motivated by enormous real-time applications that can make the traditional identification system smooth and easy. The face recognition motivates the researcher by throwing the fundamental challenges for recognizing the faces. The simple and easy approach to identification has made facial recognition as the primary biometric technology. The importance of the technique owed to easily accessible digital cameras and increased demand for security. The advantage of facial recognition over other biometric technologies is that it is natural, nonintrusive and easy to use .

- This study may be considered as a new kind of department that can be called as cyber-forensic for dealing the crime by predicting the behavior of criminals and detecting the nature of crime to be done by criminals. This study may be considered as a new kind of department that can be called as cyber-forensic for dealing the crime by predicting the behavior of criminals and detecting the nature of crime to be done by criminals.

The disclaimer of this work is that it is limited to technical and analytical aspects and not questioning social aspects as it requires a high level of caution and supervision. This work can be further improved with the availability of a large and variety of available data-set. Large corpus will also help in the disclaimer of this work is that it is

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limited to technical and analytical aspects and not questioning social aspects as it requires a high level of caution and supervision. This work can be further improved with the availability of a large and variety of available data-sets

Architecture:

An "architecture" can be defined as an abstract description of entities in a system and the relationships between them. It involves a series of decision-making processes. The architecture is a structure and a vision. A "system architecture" is the embodiment of concepts and the distribution of the correspondences between the functions of things or information and formal elements. It defines the relationships among elements as well as between elements and the surrounding environment. Building a sound architecture is a complex task and a great topic for us to discuss here. After you build an architecture, relevant parties must understand it and follow its dictates. An architectural diagram is a diagram of a system that is used to abstract the overall outline of the software system and the relationships, constraints, and boundaries between components. It is an important tool as it provides an overall view of the physical deployment of the software system and its evolution roadmap.

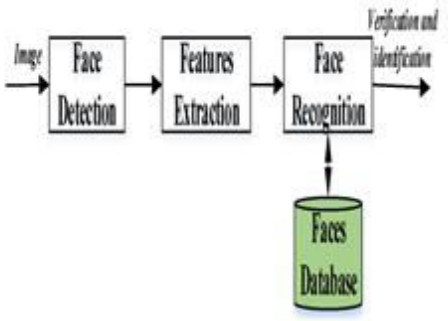

Fig 5.4 System Architecture

EXISTING SYSTEM:

In the current existing system, It aims to find spatial and temporal criminal hotspots using a set of real-world datasets of crimes. We will try to locate the most likely crime locations and their frequent occurrence time. In addition, we will predict what type of crime might occur next in a specific location within a particular time. Finally, we intend to provide an analysis study by combining our findings of a particular crimes dataset with its demographics information. There has been countless of work done related to crimes. Large datasets have been reviewed, and information such as location and the type of crimes have been extracted to help people follow law enforcements. Existing methods have used these databases to identify crime hotspots based on locations. There are several maps applications that show the exact crime location along with the crime type for any given city.

DIS-ADVANTAGE:

Even though crime locations have been identified, there is no information

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available that includes the crime occurrence date and time along with techniques that can accurately predict what crimes will occur in the future.

PROPOSED SYSTEM:

In the modern era, advanced machine learning tools have been key to crime prevention, identification and surveillance applications. Most of the crime-based analysis are being done today using some or other machine learning approaches. Crime rate diagnosis against women using machine learning approach has been reported. The authors have used previous data to predict the crime. In this proposed a methodology to identify criminal activities through a image capturing and video stream by capturing the person by the person through previous records that have been recorded in the database. Different CNN architectures like DCNN, RNN (Recurrent Neural Network), etc. have been employed to capture the abnormal behavior in the video frames. The DCNN can help in identifying important features from the frames with the help of the HDL algorithm. It is possible to detect the criminal in real-time using videos, images, and alert can be sent to a nearby police station. The pre-trained deep learning models like VGG-19 and have been used in the related literature. Real-time crime detection using Machine Learning and Deep Learning for the prevention of crime have been occurred and this proposed system application helps the police officers to know about the possible incident which may happen around in real-time and also gives the previous recorded information available about the criminal that is about his Identity and previously commited crimes.

ADVANTAGE:

Identifying criminal out of a large crowd or predicting the criminal would be easy and less time is consumed, While the investigation is going on, It becomes handy for the investigation process for facial recognition of criminal and identification of his/her details.

FLOW CHART:

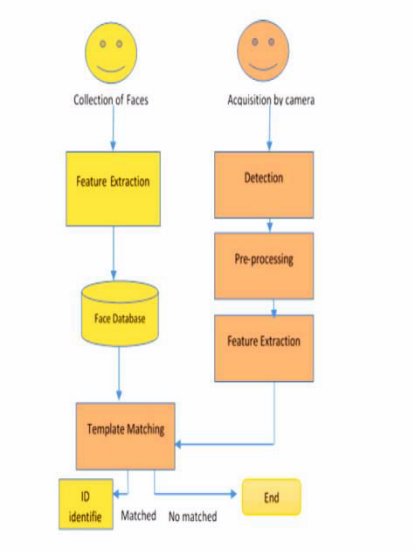

Fig 5.5 Flow chart for Criminal facial Detection

RESULT ANALYSIS

OUTPUT SCREENS:

Use python home.py command on the command prompt of Project folder

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Fig 8.1.1. Command used to obtain Criminal Detection GUI

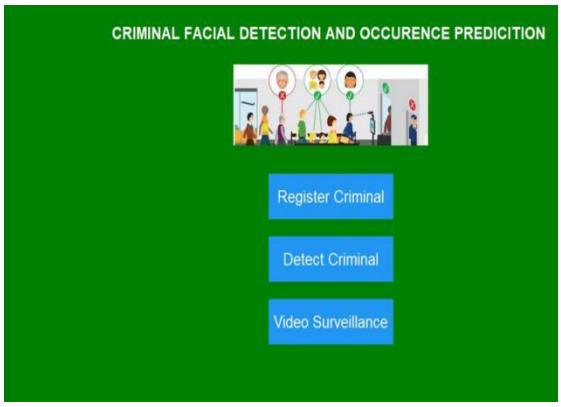

Fig 8.1.2. GUI of Criminal Detection

We get the above GUI with the following Three options:

1.Register Criminal
2.Detect Criminal
3.Video SurveillFig8.1.3. Enter the Criminal Details

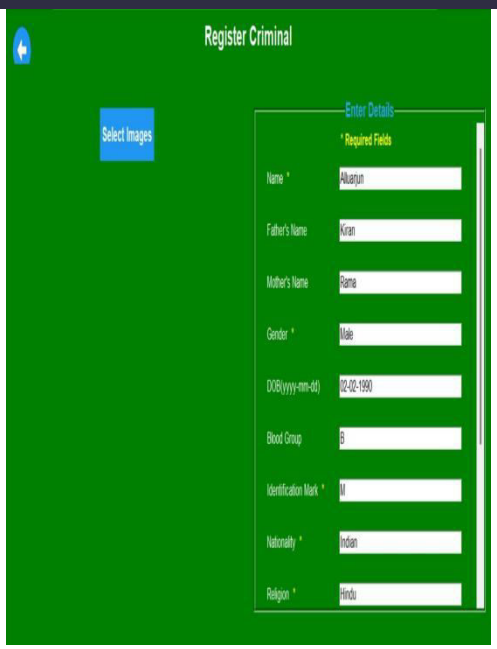

Fig 8.1.3: Enter Criminal details

In the above screen we enter the details of the Criminal such as Name Crimes Done etc. to Register the Criminal in the Database the Star mark Indicates Mandatory details

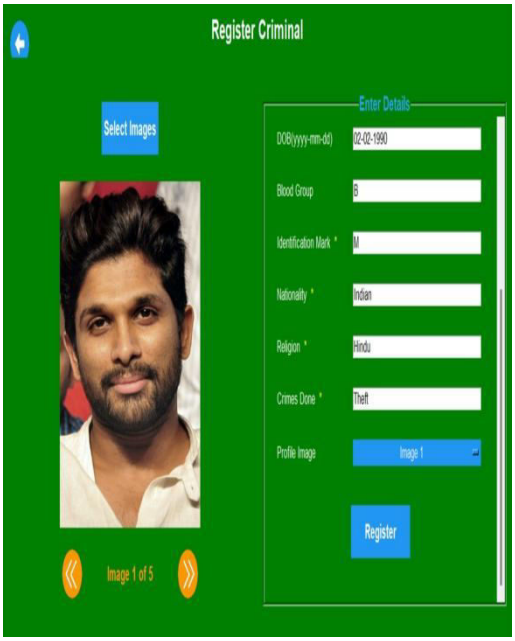

Fig 8.1.4 Select five Images of appropriate size

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Images should be selected and those of the same size and the person with clear enhanced facial features.

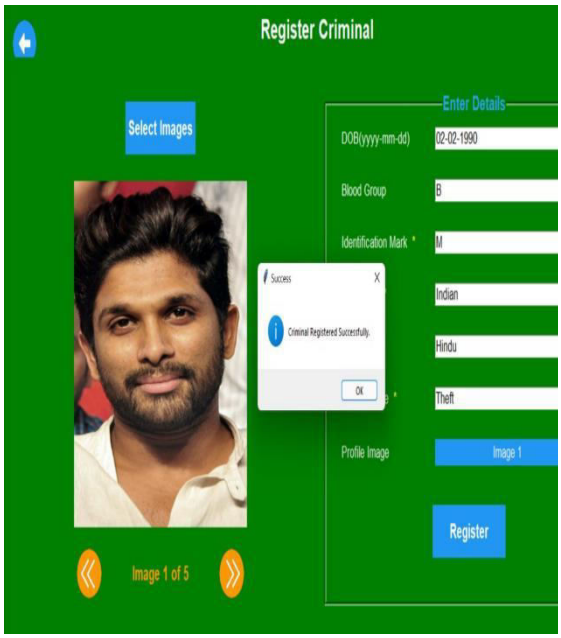

Fig 8.1.5. Click on Register Button

Click on Register. Dialogue box appears with a Message "Criminal Registered Successfully".

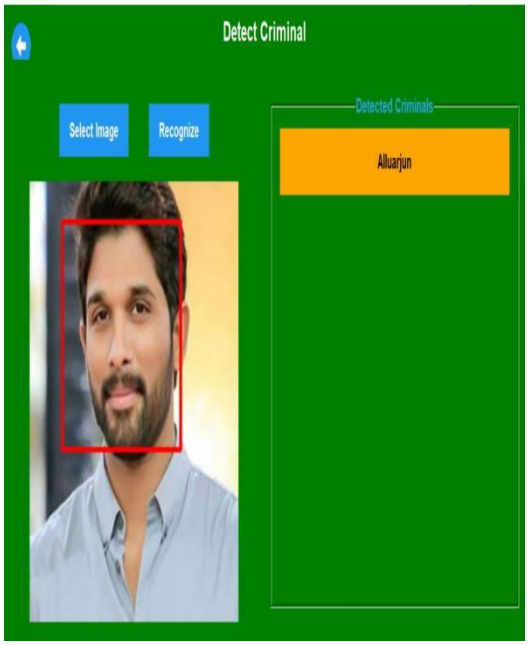

Fig 8.1.6. Detection of Criminal

Select an Image from the database and click on Recognize button to detect the criminal.

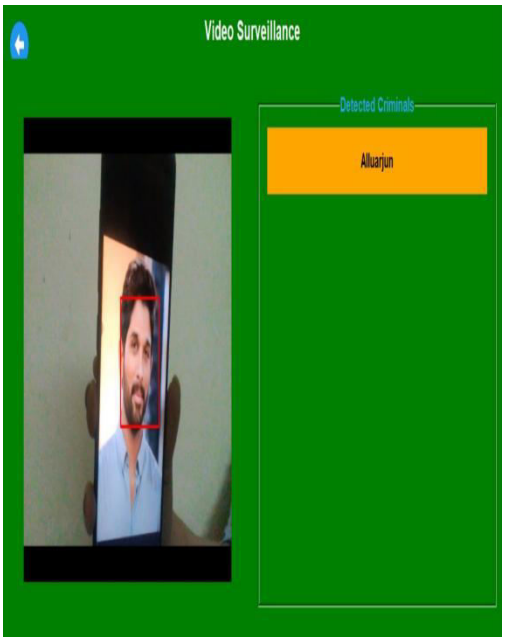

Fig 8.1.7. Video Surveillance

Go back to the GUI and select video surveillance option. Now place the Image/person in front of the Camera for detection.

Fig 8.1.8. Details of the Criminal

Click on name of the criminal to get the details

CONCLUSION AND FUTURE SCOPE :

The Twitter data set was used to train and test the models. Tweets consist of short text messages, Emoticons and Emojis. The machine learning models that were implemented were Naive Bayes, Regression and SVM. The models were trained only with the text message removing the Emoticons and Emojis and then tested and their performance was evaluated. This paper proposed a novel combination of LR and SGD as a voting classifier for emotion recognition by classifying tweets as happy or unhappy. Our experiments showed that one can improve the performance of models by recognizing patterns efficiently and through effective averaging combi- nation of models.

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We can conclude the above work stating that This study may be considered as a new kind of department that can be called as cyber-forensic for dealing the crime by predicting the criminals and detecting the criminals and also giving out the details of the criminals that are been recorded previously in the database. Identifying criminal out of a large crowd or predicting the criminal would be easy and less time is consumed, While the investigation is going on, It becomes handy for the investigation process for facial recognition of criminal and identification of his/her details.

FUTURE SCOPE:

As future work Classification of any person requires effort, but more care and seriousness is needed to classify a criminal or a suspect. The shortcoming of this work can be in its some imperfection, because any wrong classification can have serious effects. It will be very biased and too optimistic for us to say that 99 percent accuracy that has been achieved by CNN is cent percent acceptable. This is because of various reasons like, small size of data-set, all images taken are may not be taken in the same conditions, which can raise questions in this classification. Majorly facial Images are classified using facial emotions and age, so first neutral images and elderly, children images were eliminated. We tried to remove this bias by using haarcascade

by cropping the facial part out of the images, but also shown they have less impact on results .So if we create a greater data-set, by taking in account the various factors mentioned above and detecting other personality traits/features can be our future scope of study.

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