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HUMAN FACE RECOGNITION FOR VIDEO SURVEILLANCE USING DEEP LEARNING

A Face Perception Network for Video Surveillance

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I. ***Abstract :*** Surveillance cameras are having a great scope of use in public places e.g. streets, intersections, banks, shopping malls, etc. to increase public safety and it only store records or CCTV footages. Though, the monitoring capability of law enforcement agencies has not kept pace.

II. One of the critical tasks in video surveillance is detecting anomalous events like traffic accidents, crimes or illegal activities.

III. The solution to this problem involves segmentation, extraction and verification of faces and possibly facial features from an uncontrolled background. In deep learning, a CNN (convolutional neural network or ConvNet) is a class of deep neural networks, which are most commonly applied to analyzing visual imagery.

IV. The main advantages of this algorithm are uniqueness and approval as compared to others. One of the chief advantages of video surveillance over still frames is that fact accumulation over multiple frames can provide us a better face recognition performance. The need of speed and accuracy to identify is satisfied.

Keywords:

Face Detection; Face Recognition; Face Extraction; DBN; MFB; open CV; harr cascade; CNN.

I. INTRODUCTION

Now a days there is been immense progress in virtual world. Various transactions, meetings, examinations are preferred to be conducted virtually rather than in personal. In order to maintain the accuracy and security there is a high need of identifying the human faces in a visual sense. Here comes the idea of Face detection. In the last few decades, there has been a lot of research done in face detection. Using this we can identify a person's face without the help of any human support. A model that can be used in many devices to detect digital images is called face detection. Face detection can be also referred to the psychological process by which the humans locate and attend to faces in a visual scene. Face detection simply answers two questions - Are there any human faces in the collected images or video? Where is the located?

Face detection is used to verify the biometrics and even to unlock devices. Face recognition is broadly a problem of identifying or verifying people in photographs or videos. It is a process comprised of detection, alignment, feature extraction, and recognition. It is a task that is trivially performed by machine, even under varying light and when faces are changed by age or obstructed with accessories and facial hair.

Deep learning methods are able to leverage huge datasets of faces and learn rich and compact representations of faces, allowing modern models to first perform as-well and later to outperform the face recognition capabilities of humans.

1.1 Motivation

In a country like India public safety is emerged as an important factor, due to the growing crime rates, increasing terrorism, missing children/runaway cases.

As the population is increasing day-by-day, controlling the mishaps has become a tedious job as crime,

violence, and fear in cities pose significant challenges to law enforcement authorities.

1.2 Aim

The primary aim of face detection and recognizing algorithms is to determine whether there is any face in an image or not. Face Detection is the first and essential step for face recognition, and it is preferred for detecting faces in the images.

1.3 Objective

1. The objective of Human Face Detection is, from the incoming camera sources, find a series of data of the facial features in a set of training images in a database.
2. Face detector should achieve this aim despite illumination, rotation, different facial expressions, orientations and camera distance from the object.
3. Another objective would be feature extraction network which consists of Motion Fusion Block (MFB) and Feature Transfer Block (FTB). In brief, MFB is a dynamic image network which summarizes the appearance and motion of the video sequences.
4. Improved time complexity for effective accurate result.
5. Easy to find out person by using image processing.
6. Recognize the person in the image.
7. Keep in check whether the person has any criminal record.

II. LITERATURE SURVEY

I. **Robust Face Detection Using Template Matching Algorithm. [2008]** - Helped in understanding the different approaches to achieve face detection. **Advantage-** Explained feature based techniques in detail. **Disadvantage-** Model Based Approaches are not well defined. **Ideas for Implementation-** Selected the neural approach to achieve detection.

II. **Human Face Detection by Using Depth Information. [2014]** - Provide Harr Implementation method. **Advantage-** System is able to distinguish between the real face and picture face. **Disadvantage-** The person should be steady in front of cameras to get the accurate depth map. **Ideas for Implementation-** Integrated Harr cascade algorithm to extract features.

3) Deep Learning Network for Face Detection.[2015] - Deep Learning approach for detecting feature is provided. **Advantage-** This training way will improve the classification accuracy. **Disadvantage-** It does not consider dynamic inputs. **An idea for Implementation-** RBM training approach is developed.

4) Facial Detection Using Deep Learning. [2017]- It provided a basic idea about what face detection is and how it can be achieved in simple words. **Advantage-** The advantage of this model is that it is able to recognize blurred images and side face images. **Disadvantage-** The only drawback is that it fails to recognize eyes with glasses**. Idea for Implementation-** DBN approach is been identified.

5) The Face Recognition Method Based on CS-LBP and DBN. [2018]- Training and testing of the model is provided. **Advantage-** Low computation complexity and short time-consuming. **Disadvantage-** Large number of computations required. **Idea for Implementation-** Training and testing phase is considered.

6) Deep Learning-based Facial Detection and Recognition in Still Images for Digital Forensics. [2019]- Provided a base for Facial detection in still Images. **Advantage-** FDRI will benefit, achieving a lower execution time per processed image. **Disadvantage-** The model yielding poor recognition results with non-Caucasian faces, especially with Asian individuals. **Idea for Implementation-** HOG method is studied for better implementation.

7) Research on recognition of Criminal Suspects based on Foot sound. [2020]- Considered footstep as a parameter for recognizing the criminal suspects. **Advantage-** Frequency Domain features of footsteps are considered. **Disadvantage-** More optimal solution can be used. **Idea for Implementation-** To sense different human parameters for recognizing persons.

8) Remote Compact Seismic Sensor for the Moving Person Detection. [2020]- Designed a seismic sensor for detecting the dynamic movements of person. **Advantage-** The developed seismic sensor has the best parameters, which allows it to be successfully used both for reconnaissance purposes, and for various civilian and military objects guard. **Disadvantage-** Detection algorithm can be improved. **Idea for Implementation-** Extracted an idea to detect the moving persons face.

9) Criminals and Missing Children Identification Using Face Recognition And Web Scrapping. [2020]- It used a step by step procedure form image aquistation to template matching for recognizing faces. **Advantage-** Accuracy is satisfying. Requires less memory as compared to others. **Disadvantage-** More new techniques can be considered. **Idea for Implementation-** Extracted an idea for identifying the criminals.

10) Automated Criminal Identification By Face Recognition Using Open Computer Vision Classifiers. [2020]- It used automated surveillance for face extraction. **Advantage-** System serves as a fruitful method of identifying the faces. We use citizenship database which already exists. **Disadvantage-** Latest technologies could be involved in it. **Idea for Implementation-**In India, we have a system for recognizing citizen called Aadhaar. Can be used in a citizenship database where we can differentiate between citizen and foreigner and further investigate whether the identified person is criminal or not.

III. PROBLEM STATEMENT

To build a face detection model by integrating the deep belief network a feature of deep learning domain. To

recognize the image detected using CNN model of machine learning domain.

There are two main concerns and challenges taken in this work. One is to overcome the complexity introduced by the variety of the face angles in photos taken by arbitrary users. And second is boosting the overall accuracy of the system in comparison with the face detectors that use feature-based approach and template matching techniques

Recently to detect and identify criminal and dead body is so difficult. So, we are going to implement a proposed model for a Crime Scene Perception Network for Video Surveillance Based on Deep Learning. Therefore, there has to be a direct application in any urban safety strategy, aimed at reducing and preventing problems of crime and insecurity.

IV. PROPOSED SOLUTION

4.1 Harr-Cascade-

Among all of the other object detection method Haar feature-based cascade classifier is the most effective method. For training the classifier we need a lot of image of faces and without faces. Image with faces are called 'Positive Image' and image without faces are called 'Negative Image'. The value of each feature is calculated by subtracting the sum of Pixels of white rectangle and black rectangle.

Fig. 4.1 Haar-Cascades frontal faces default working.

4.2 Convolutional Neural Network –

A CNN is a kind of network architecture in deep learning algorithms and is specifically used for image recognition and task that involves the processing of pixel data. There are four different types of layers in a convolutional neural network: the convolutional layer, the pooling layer, the ReLU correction layer and the fully-connected layer. CNNs plays a vital role in diverse tasks/functions such as image processing problems, computer vision tasks like localization and segmentation, video analysis, to recognize obstacles in self-driving cars, also including speech recognition in natural language processing.

4.3 Feature Extraction-

Digital Image dispensation is a method of processing the image whether it be a colored images, Gray Scale Image or Binary Images. Using any images from above image processing can be done using Feature extraction techniques, classification techniques or clustering or recognition techniques.

The image feature set needs to take out the most appropriate features for object detection or classification while on condition that invariance to changes in illumination, differences in viewpoint and shifts in object contours. Anomaly Net consists of two sub-networks. In this section, we introduce the first one, i.e., feature extraction network which consists of Motion Fusion Block (MFB) and Feature Transfer Block (FTB). In brief, MFB is a dynamic image network which summarizes the appearance and motion of the video sequences.

4.4 Motion fusion block-

Abnormal events in video data are defined in terms of irregular shapes/motion/ both of them. To better reveal the characteristics of motion and appearance, one core task is to adequately capture the dynamic abnormal behavior information.

The proposed method will work upon Pre-processing, Segmentation, Feature Extraction and Classification.

V. SYSTEM ARCHITECTURE

5.1 Criminal Recognition from Video Surveillance –

The below architecture describes the entire flow of the system. Images of the missing bodies, lost persons or the criminals are provided as an input to the system which generates FIR details by collecting important data like photo location personal details.

The preprocessing stage will consist of two main concepts the face detection and face recognition which is can be achieved by haar-cascade method via which the facial features are extracted and then CNN model will try to match the features extracted with the dataset provided to the system and identify if the person is dead or has any criminal record. The software would prefer live database which is updated with all live records.

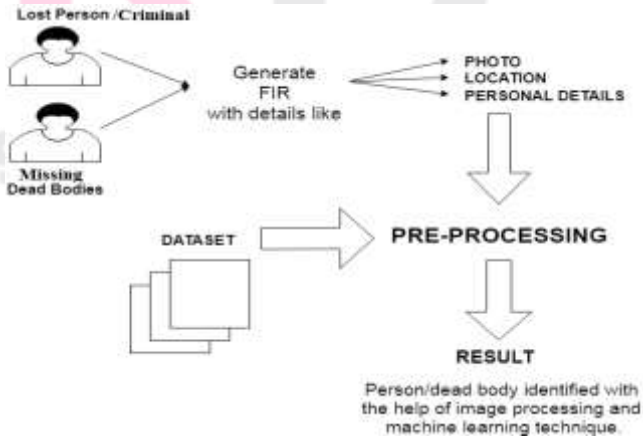

Fig. 5.1 System Architecture for Criminal Recognition from Video Surveillance.

5.2 Face Recognition Flowchart-

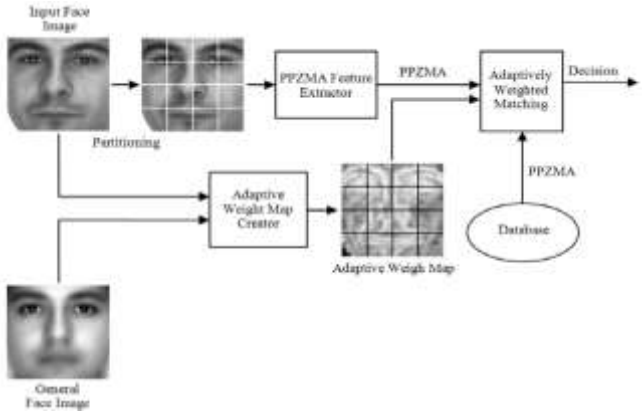

Fig. 5.2 Human Face Recognition Flowchart.

VI. RESULT

This model pays special attention to the main consequences of face recognition for criminal identification. It deals with outline development of given data and testing the Face recognition. Criminal photo captured through a video source is fed the identification of the system which has the capacity for automatically doing the process like recognize, detect and extract the features of the images. This model got 98% of accuracy for detecting real time image through video surveillance.

Fig 6.1 Recognition result image.

VII. CONCLUSION

We propose a Deep learning approach to detect real-world criminal, lost per- son, dead body identification in surveillance videos. Due to the complexity of this realistic crime scene, using only normal data alone may not be optimal for criminal/dead body identification. We attempt to exploit both normal and crime surveillance videos. To avoid labour-intensive temporal annotations of crime segments in training videos, we learn a general model of criminal detection using deep multiple instance ranking frameworks with weakly labelled data. In future we can extend this model for lie detecting application by examining the features or expressions of eye. Emotion detection using this concept will also have great scope in future.

VIII. REFERENCES

[1]Fuxiang Liu[1] , Qi Jiang[1]. Research on Recognition of Criminal Suspects Based on Foot Sounds. IEEE 3rd Information Technology,Networking,Electronic and Automation Control Conference (ITNEC 2019).

[2]Pavel P. Fastykovsky and Yaroslav I. Lepikh. Remote Compact Seismic Sensor for the Moving Person Detection. Faculty of Physics, Odessa I.I. Mechnikov National University, Odessa 65000, Ukraine.

[3]Manik Sharma. Facial detection using deep learning. et al 2017 IOP Conf. Ser.: Mater. Sci. Eng. 263 042092.

[4]Patricio Domingues, Alexandre Frazão Rosário. Deep Learning-based Facial Detection and Recognition in Still Images for Digital Forensics. ACM, New York, NY, USA, 10 pages. https://doi.org/10.1145/ 3339252.3340107.

[5]Xueyi Ye, Xueting Chen, Huahua Chen, Yafeng Gu, Qiuyun Lv. Deep Learning Network for Face Detection. Proceedings of ICCT2015.

[6]S.AYYAPPAN, Dr.S.MATILDA. Criminals And Missing Children Identification Using Face Recognition And Web Scrapping. IEEE ICSCAN 2020.

[7]Waqar Ali[1],Wenhong Tian[23],Salah Ud Din[4] ,Desire Iradukunda[5],Abdullah Aman Khan[1]. Classical and modern face recognition approaches: a complete review. https://doi.org/10.1007/s11042-020-09850-1.

[8]Apoorva.[P1] ,Impana.H.[C1] ,Siri.S.[L1], Varshitha.M.[R1], Ramesh.[B2]. AUTOMATED CRIMINAL IDENTIFICATION BY FACE RECOGNITION USING OPEN COMPUTER VISION CLASSIFIERS. ISBN: 978-1-5386-7808-4.

[9] Linxiang Zhao. Yi Wan. A New Deep Learning Architecture for Person Detection.2019 IEEE.

[10] B. Amos, B. Ludwiczuk, M. Satyanarayanan, "OpenFace: A General PurposeFace Recognition Library With Mobile Applications", Carnegie Mellon Uni-versity, Pittsburgh, 2016

[11] E. Learned-Miller, G. Huang, A. RoyChowdhury, H. Li, G. Hua, "Labeled Faces in the Wild: A Survey", Springer, pp. 189-248, 2016. 3

[12]M. Chihuahua, A. Elke, W. Belly, Chore Ben Amar, "A Survey of 2D Face Recognition Techniques." Computers, 2016.

[13] Jurgen Sachs and Ralf Herrmann, "M-sequence-based ¨ ultra-wideband sensor network for vitality monitoring of elders at home," Radar, Sonar Navigation,IET, vol. 9, no. 2, pp. 125–137, 2015.