

Smart Face Sketch Recognition Using Computer Vision And CNN Model

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Abstract

Each individual has specific identity, which can be identified through faces. This system is based on two techniques – Face detection and Face recognition. This process is performed to detect the faces using inbuilt camera inside room and Face recognition is execute on live obtained images to detect whether the required faces are present in the captured video or not. The system first detects the face and compared with dataset to recognize the face. Face recognition task is to identify the individual face from captured multiple faces. After separation of face, it will check with stored image properties. A face recognition system is done with help of biometric data process; its applicability is available on fingerprint scanning, signature, etc. We proposed deep learning algorithm Convolutional Neural Network (CNN), used for image identification and classification purpose. Face recognition system plays a vital role in recognizing the faces then to perform some real time computation in the system. It is mainly used in the biometric system. These systems have higher accuracy compared to traditional techniques.

Keywords: Face recognition, Faster Region, Convolution Neural Network, Face attendance system.

1. Introduction

Face detection and recognition systems are used in our day today application like smart phone to keep our phone secure. Face detection attendance system requirements camera, face detection algorithm and database. This system requires the admin to provide the student details like image, name. It also requires the admin to provide dataset for each student. This system first captures an image and then performs face detection from group of to detect the individual face in the captured image. For this purpose we use neural network. After that the system performs face recognition by comparing the detected faces with the student image in the database.

If it is matched, then the system make present for that student. The overall process are automated and performed on daily basis. In order to get better the exactness of input model perform capturing process [1][2], detection and recognition process every 30 minutes to ensure the student is present. Face detection and recognition system are highly used for the security purpose. These techniques are used to keep the applications secured by using face lock. The performance and efficiency of the face based system depends on the dataset provided to the system by the admin. The dataset consist of the images of the individual, So this system can recognize the face which present in the captured image [9][10]. The camera is used to capture the image which can be accessible easily.

In proposed architecture user CNN model for future extraction and classification approaches. It is the best model provided by deep learning domain. So the image should be quality one, otherwise this model does not provided efficient output. The paper is prepared as follows: In section II, Literature review is presented. In section III, Explained about Proposed work. In section IV, explained about methodologies used in the proposed work. In Section V,

Novel system results are discussed. In section VI, Conclusion and Future Enhancements are presented[12][13].

2. RELATED WORK

Andre Teixeira Lopes, Edilsonde Augier et.al recommended that the novel strategy, named “Deep Comprehensive Multi-patches Aggregation Convolutional Neural Networks (DCMA-CNNs)” [12], to take care of FER issue. The proposed technique is a profound based system, which predominantly comprises of two parts of Convolutional Neural Network (CNN). One branch extricates nearby highlights from picture patches while different concentrates all-encompassing highlights from the entire expressional picture. In our model, neighborhood highlights portray expressional subtleties and all-encompassing highlights describe the elevated level semantic data of an articulation. The authors used both nearby and comprehensive highlights before making arrangement. These two kinds of various leveled highlights speak to articulations in various scales. Contrasted and most current strategies with single kind of highlight, our model can speak to articulations all the more completely. Also, in the preparation organize, a novel pooling methodology named Expressional Transformation-invariant pooling (ETI-pooling) is proposed for taking care of annoyance varieties, for example, turns, variation enlightenments, and so on. Broad tests are directed on the well-known “CK+ and JAFFE articulation datasets”, where the acknowledgment results acquired by our model are better than most existing FER techniques

A. T. Lopes, E. de Aguiar we propose a Part-based Hierarchical Bidirectional Recurrent Neural Network (PHRNN) [11] to break down the outward appearance data of transient arrangements. The authors proposed a model using PHRNN for “facial morphological varieties and dynamical advancement of articulations”, it is viable towards extricate "transient highlights" in view of facial tourist spots (geometry data) from back to back casings. In the mean time, so as to supplement the still appearance data, a Multi-Signal Convolutional Neural Network (MSCNN) is proposed to extricate "spatial highlights" from still edges. We utilize both acknowledgment and check flags as supervision to compute distinctive misfortune capacities, which are useful to build the varieties of various articulations and diminish the distinctions among indistinguishable articulations. This profound Evolutional Spatial-Temporal Networks (made out of PHRNN and MSCNN) remove the halfway entire, successfully improving the exhibition of outward appearance acknowledgment. Exploratory outcomes show that this technique to a great extent beats the best in class ones. On three broadly utilized outward appearance databases, proposed strategy decreases the blunder paces of the past best ones by 45.5%, 25.8% and 24.4%, individually[14][11].

LDTP proficiently encodes data of feeling related highlights [3][4] (i.e., “eyes, eyebrows, upper nose, and mouth”) by utilizing the directional data and ternary example so as to exploit the vigor of edge designs in the edge district while beating shortcomings of edge-based strategies in smooth locales. In the proposed architecture, dissimilar to existing histogram-based face portrayal strategies that partition the face into a few locales and test the codes consistently, utilizes a two level framework to develop the face descriptor while inspecting appearance related data at changed scales. We utilize a coarse lattice for stable codes (exceptionally identified with non-articulation), and a better one for dynamic codes (profoundly identified with articulation). This staggered approach empowers us to do a better grain portrayal of facial movements, while as yet describing the coarse highlights of the demeanor. In addition, it will take in the dynamic LDTP codes from the emotion related facial areas. We tried our technique by utilizing person dependent and autonomous cross-approval plans to assess the presentation [8]. The author Proposed methodologies improve the generally speaking exactness of outward appearance acknowledgment on six datasets.

3. PROPOSED WORK

The face detection system is based on CNN (Convolutional Neural Network) [5], RPN (Regional Neural Network). CNN plays major role in the system, the function of this approach is to recognize the image captured by camera, and do classification based on the image characteristics. Once the classification [6] happens object will be detected. The classification checks the image property using the occurrence of entity particular. RPN forecasts the possibility of an anchor being surroundings or foreground, and refine the anchor. This process are done by using edge computing, it will capture the data from edge of each node, in which edge is a computing device and network resource along with the dedicated path of generated data sources and cloud data centers.

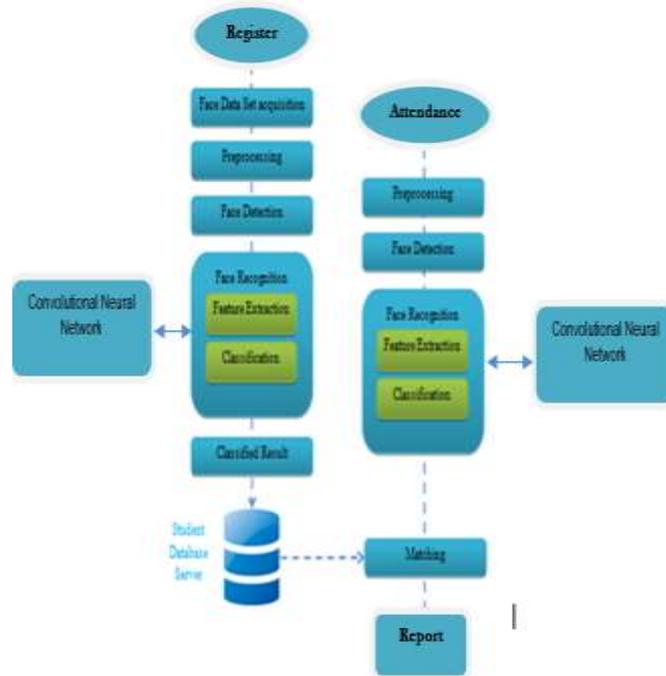
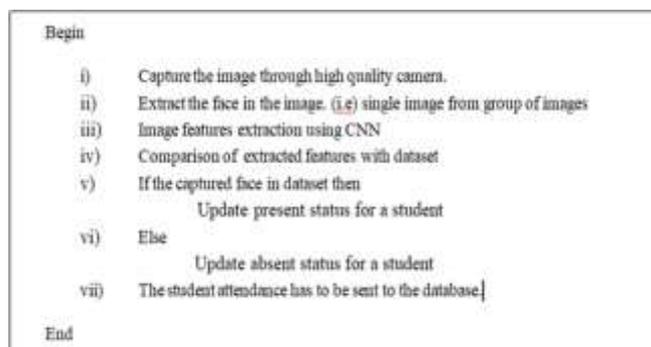


Figure-1: Proposed System Architecture

METHODOLOGIES USED

In this section explained about methodologies used in proposed work. In this consists of CNN model for data set regression and classification [7]. In enrolment phase, how students details are registered with the database, and what are all the features extracted from the captured image. In verification module uses the CNN model for comparison of captured image with the dataset. Before comparing with the data set CNN model extracts the features from the images and compared with captured image.



Algorithm-1: Proposed system pseudo code

CONVOLUTIONAL NEURAL NETWORK (CNN) MODEL

This is a one of the most famous class available in the deep learning domain. This class is mainly selected for analyzing visual image. This model consists of three layers. Those layers are input layer (IL), output layer (OL) and many hidden layers. This hidden layer used to recognize the image and extract the various feature of image. The most important work of hidden layer is back- propagation. The output of one layer is sent to another layer until it achieves the result.

ENROLLMENT PHASE

The face based attendance system consists of face database and attendance database to contain information about the students such as image of the student, name of the student and other information. The attendance database contains the student present status which is updated to the database on day basis.



The image shows a web interface for a 'Student Monitoring System'. At the top, there is a yellow header with the text 'Student Monitoring System' in red. Below the header is a black navigation bar with links for 'Home | Student | Report | Logout'. Underneath the navigation bar is a section titled 'Student Information'. The main content area features a 'Register' form with the following fields: 'Username', 'ID', 'Roll Number' (with the value '881234567' pre-filled), 'Email Address' (with the value 'vn@gmail.com' pre-filled), and 'Mobile'. A blue 'Register' button is located at the bottom of the form.

Face Image Acquisition

The process of extracting one or more image from the captured image of video is called image actuation. Here we used face image recognition for extracting the image from group of faces. The format of capturing image may be photos or videos. In order to perform face detection and recognition on the captured image, then it is necessary to have high quality camera. In this model design used high quality captured devices for getting input from outside.

Preprocessing

The system captures the image and converts it to gray scale. To reduce the noise from the captured image we implement Gaussian filter, this approach can help to extract the features of image even imagers are blur condition.

Face Detection

This face detection process identifies and detects the human face from the captured image. Face detection component is important and it is performed by camera. This technique used to find whether the particular person is available in the captured image or not.

VERIFICATION MODULE

After capturing the image, the image is sent to the feature extraction to gather the features as vector. The classification process is done by the classifier DCNN. The classified faces are compared with database to identify whether the face is available or not. If it is available, then the system provides present status to the database. If not, it provide absent status to the database. This component is important in deciding present/absent status. The dataset provided by the admin should be enough to detect the faces. Because based on these dataset the system detect and recognize the face.

ATTENDANCE SYSTEM

If the system recognized the face, it provide present otherwise absent status. The system performs this process for each day and updates the attendance details. These attendance details are available to the admin. It is also possible for the admin to provide present or absent status. These attendance details are available in the database. The attendance details provided to the database by the face detection system by the daily basis. The attendance details are available to the admin and the parent's .These details are also accessible by them through the application.

Regno	Name	Attendance	Absent Periods	Period	Action
111	08-03-2020	Present	0		Delete
103	08-03-2020	Absent	1	Period1 Period2 Period3 Period4 Period5 Period6 Period7	Delete

NOTIFICATION SERVICES

The face attendance system support notification services. These notifications are sent to their parents about the attendance. These notification services are automated in the system . The admin is able to access the attendance. Based on the need the notification has been sent to the student parent's .so that the parents can able to view their attendance details.

i) False Accept Rate (FAR) or False Match Rate (FMR):

The system has some problems which occur in the image recognition. If the captured face has low accuracy, the system has unfortunately accepted. In order to overcome this issue, the system use FAR.

ii) False Reject Rate (FRR) or False Non-Match Rate (FNMR): It is a measure of how often a biometric authentication system incorrectly rejects an authorized user.

iii) Equal Error Rate (EER): This can be describes by using the ROC curve. If the False Acceptance Rate increases, then the False Reject Rate decreases, vice versa. The point where both the curves meet is considered as Equal Error Rate.

iv) Failure to Enroll Rate (FTE or FER): It is the percent of data (face) taken as input by the system is invalid. It may occur due to requirements fault in the system.

v) Failure to Capture Rate (FTC): In automatic systems, the probability of the system fails to identify a biometric characteristic when applied properly is commonly treated as FTC.

These attendance details and the information gathered from the database are used for several purposes. The attendance details provided by the face detection and recognition System is managed by the system admin.

4. EXPERIMENTAL RESULTS

Face detection and recognition system is important in to provide attendance for a student. This type of systems is important in automating the human need. The student attendance details are available in the database, which can be used to generate student report. This system support notification services. These services are used to notify the parents. The system admin is able to send the notification to the parents. The face detection and recognition system is implemented by using opencv.The below database describe name of the student with present or absent status. The system supports to display the accuracy by providing the name of the student.

Sl. No	Roll No	Name of t student	Status	Time Taken
1	CS1608	Johnson	Present	10.15AM
2	CS1610	Jerald	Present	10.15AM
3	CS1622	Jancy	Absent	10.15AM

Table 1: Status of Students in class Room

The below chart describes how much time the student is available in the class with accuracy. There is difference in accuracy. The accuracy is affected by several factors such as Light brightness. If high quality camera is used to detect the human faces, then the accuracy of the captured image is high. The below chart describes the accuracy for a student.



In the student registration phase, authenticated students can be entering their details. The authentication is verified through One time Password (OTP) approach. After registration completed these information are verified through college system administrator.

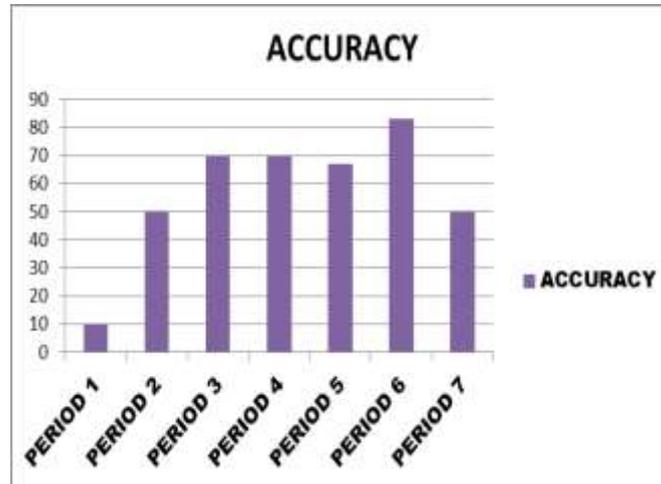


Figure 6: Accuracy chart for attendance

The face detection and recognition system are developed to help the human. Because the systems are efficient compared to the human. These types of systems are accessible by using application. The accuracy depends on the dataset provided by the admin and the image quality. The system admin can able to access the Face detection and recognition system using the following site.

5. CONCLUSION

This system is based on the deep convolutional neural network but it is traditional. So we use fast convolutional neural network with edge computing techniques. It is used in biometric application. Even though this system is useful in smart classroom, it has its own limitation such as camera quality, blurred faces. If the quality of the captured image is low, then the system consider that the student is absent even though the student is present. In order to overcome this high quality camera should be used. It is used to provide security through Biometric Authentication. It is used in the Automated Image Recognition system. It is deployed in the security system. In future enhancement we planned to provide security through Biometric Authentication. This approach is used in the Automated Image Recognition system. In future enhancement we planned to implement this model using low quality captured devices.

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