



Automatic Attendance System Using Face Detection With Faster RCNN in Python

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Abstract : Now-a-days, presenty is that the major think about colleges or big organizations. In manual presenty system, It takes an excessive amount of time or sometime happens to miss someone or take multiple presenty. Deep learning based application algorithms, mostly utilized in face identification. In this paper, inset Haar cascading algorithm as well as Faster RCNN algorithm. Take comparison between these two algorithm & choose the simplest suitable for face identification with minimum time. Faster RCNN which has impressive leads to object detection. The Faster RCNN is that the recently developed method or technology of C.N.N. C.N.N has ability improve the charactericts of picture s. Face database is collected to acknowledge the scholar face. . This system is real-time system, which uses open source picture processing framework referred to as Open CV. These system automatically creating presenty & sends the messages to parent and teacher.

IndexTerms – Haar Cascading Architecture, Faster RCNN Architecture, Raspberry Pi 3b+, Pi Camera, VGA to HDMI cable.

I. INTRODUCTION

Now-a-days presenty is regard an utmost significant consideration for pupil & staff or in multinational organizations. The present days, presenty system is manual. It takes too much time for pupils as well as teacher. With the advancement techniques of learning trick, the machine not only automatically but smoothly finding out the pupil & maintains the records of given collected information. With the improved techniques of N.N, the machine quickly finding out particular pupils & maintains same information's of same collected information. In currently manually presenty systems, sometimes any student missed out from teacher, or sometimes pupils gives multiple presentys in not present all their friends. Due to difficulties increases during we all are go through old processes of manual presenty or in/out of pupils entries in classroom/hostel.

There are various presenty system like finger print based presenty, iris reorganization, face identification based etc. Iris recognition has more expensive & have high cost. Compared with another biometric system the face identification with deep learning algorithm gives more advantages. Automatic presenty system increases the productivity of class. The Face search is a P.C. based technic employed in most of use that find out the man or woman upper part in like digitaly used camera. Many Face identification calculation or flow chart focus on the detections of front part human faces. Here, Deep learning based the Faster RCNN flow chart is advantages for face identification system. Here we take presenty of the pupils by use of traditional face identification & the findout of during class or in/out time.Raspberry PI is the key control system that can send all information to the Internate or drive. Internate or drive is a Any search engine e.g.Google backend uses software web apps.. The raspberry pi camera equipment is the additionallyconsume forperticular continuous sight on the face. Theessential of title is to The main era of this title is to automatically take IN/OUT entries & insert records save record on firebase cloud for hostel management using face identification with faster R-CNN python open-cv.

II METHODOLOGY

Automatic attendance system, consist of above below diagram. It consist face detection based- Haar Cascading and Faster RCNN algorithm and recognition based – matching filter algorithm.

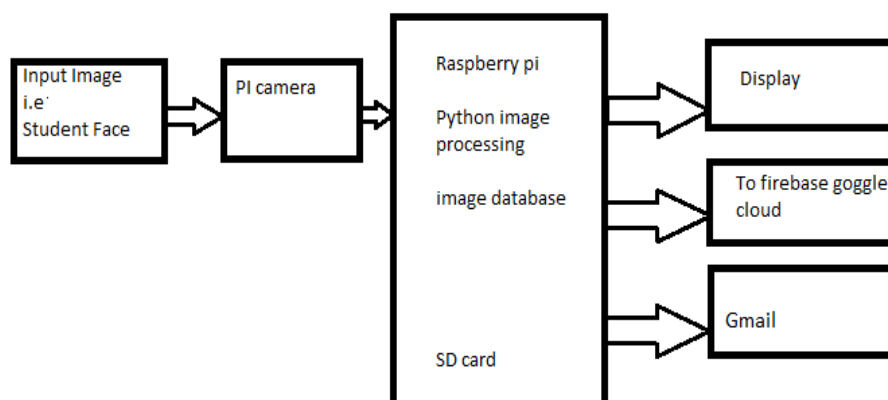


Fig.1. Block Diagram of system

1. Capture video: The Camera is fixed at a specific distance at gate to capture videos of the frontal images of the entire students.
2. Stored Separate as frames from the video: The captured video needs to be converted into frames per second for easier detection and recognition of the students' Face to generate the attendance database.
3. Face detection: Face identification is the system where the pictures are given as an input & where it is searched to seek out any facial identification, after detecting the face the picture processing captured face picture for ease of recognition of the face. The new & Faster R-CNN algorithm can be implemented to detect the faces.
4. Face recognition: & when after the process of identification the facial , it is compared to the faces that present pupils'.

Now, here for face identification purpose, firstly we compare the two detection methods & choose which is most suitable for our project. Here we choose faster RCNN for face detection.

2.1 HAAR CASCADING ARCHITECTURE

The particular Facial identification algorithms specialize in the capturing the frontal man or woman faces. & the Object detection using HAAR characteristics-based avalanche classifier is an efficient expression detection method. Viola-Jones Face identification Technique popularly referred to as Haar Avalanches, & exploring a number of the interesting concepts suggestion by them. Following is the Haar cascading architecture steps -

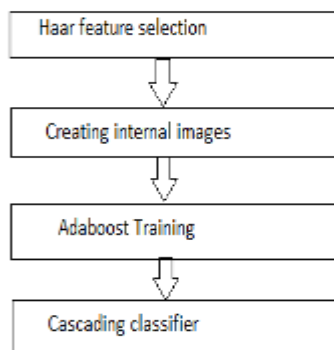


Fig.2.Haar Cascading Architecture

2.1.1 Haar Features : Positive pictures represent brighter part of face & negative pictures represent darker part of face. Haar characters are same as to those convolution methods which are being used to find the presence of that character in that given photo. Results give good at pixels. So that, convolution pixel pattern matches with the reference pixels. Every characteristic results in one evolution which is calculated by minus the addition of pixels under the white rectangle toward the summation of pixels under the black rectangle

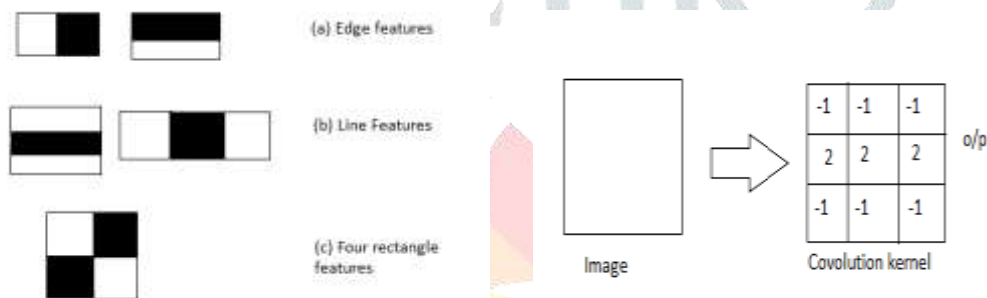


Fig.3.HAAR Feature

Fig.4.HAAR Feature output

2.1.2 Integral part of picture : In an integral part of picture the at pixel at x axis & y axis is that the summation of pixels above & to the left of both axis. It takes corner pixel values of an image. Last pixel to reach bottom right side of corner of the Integral Picture are going to be the summation of all the pixels within the Original image. It reduces the time complexity of each addition gradually, because the quantity of additives doesn't depend on the amount of pixels enclosed anymore.

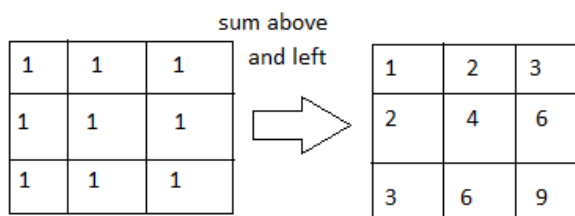


Fig.5. Integral Image

2.1.3 Adaboost training : Adaboost removes the characteristics that we do not need. It assists in finding only the best characteristics among all these characteristics.

2.1.4 Cascade Classifier : classifier is employed which consists of stages every containing a robust differentiator. Due to all the characteristics are grouped into different steps where every step has particular no of characteristics. After detection of face it passes for recognition.

2.2 FASTER RCNN ARCHITECTURE

Deep learning models, with their multi-level structure, are very helpful in extracting complicated information from input images. Convolutional neural networks are reduce computation time. Faster RCNN is the modified version of RCNN.

This architecture consists of following steps :

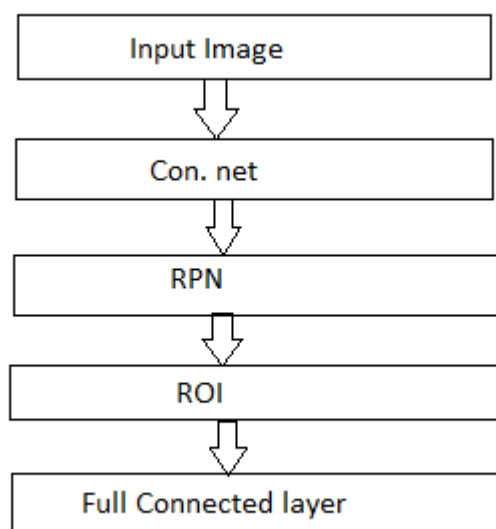


Fig..6. FASTER RCNN Architecture

Take input picture s from camera & passes to convolutional network which back the tomorrow's map for that picture . This connection is faster & applied for real-time object identification. Thatre back the picssuggestion along with their pic. . This returns the object proposal along with their abjectness score. RPN uses a sliding window over these feature maps and each window; it generates k anchor boxes of different shapes and sizes.

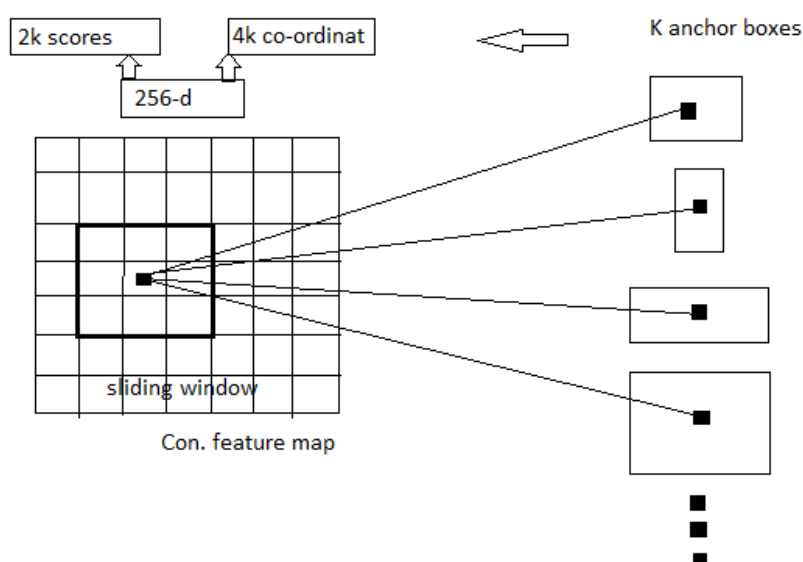


Fig.7. Rejion Proposal Network

A ROI pooling layer is applied on these proposals to bring down all the proposals to the same size. Finally , the proposals are passed to a fully connected layer to classify the bounding boxes for objects. Faster RCNN gives better feature extractor and performs much good as compare to another.

Face detection is a process where the image, given as an input is searched to find any face.

2.3 RECOGNITION

After the completion of face detection , processing on face. It is compared the faces which is presented in data base and real time faces. Further the recognized image of the student is provided to system marks attendance or in/out entries. Here we use inbuild Dlib library for matching purpose .

2.4 FLOW CHART

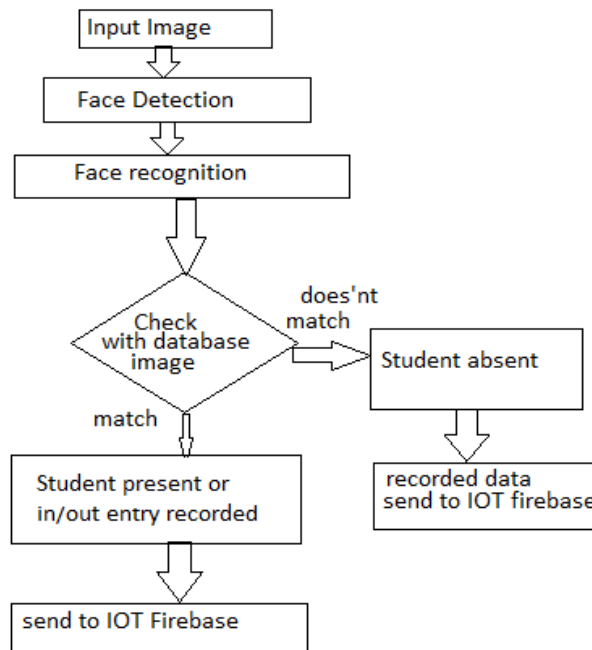


Fig.8. Flow Chart

Above diagram shows the flow chart of the system. Student face capture by using pi camera. Then face detected and recognized by using faster rcnn algorithm and dlib library. When face is recognized then student entry/out time and date is recorded. And this data is send to firebase system for storage purpose. When face is not detected then this goes into unkwon.

III FORMULAS AND CALCULATIONS

3.1 Formulas:

- 1. Accuracy : $TP + TN / TP + FP$
- 2. Precision : $TP / TP + FP$
- 3. FAR = $FP / FP + TN$
- 4. FRR = $FN / FN + TP$

3.2 Calculations:

Here we take 25 student face database . According to that we take this following reading.

TP	24	FP	1
FN	2	TN	23

Table.1.Reading

1. Accuracy : $TP+TN / TP+FP = 24+23 / 24+23+2+1 = 0.94 = 94 \%$
2. Precision : $TP/TP+FP = 24/24+1 = 0.96 = 96 \%$
3. FAR = $FP / FP+TN = 1 / 1+23 = 0.041 = 4.1 \%$
4. FRR = $FN / FN+TP = 2/2+24 = 0.0769 = 7.69 \%$

IV. RESULTS AND DISCUSSION

4.1 Results

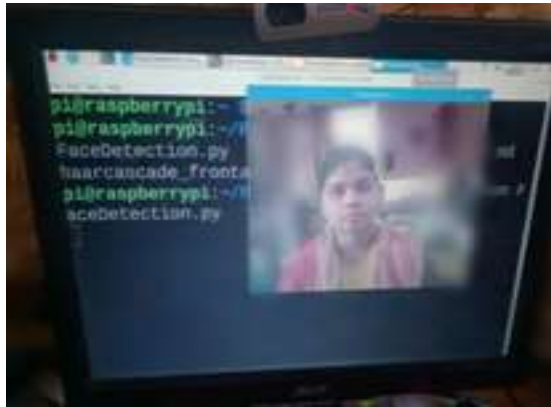


Fig.9. Face detection – Using HAAR Cascading

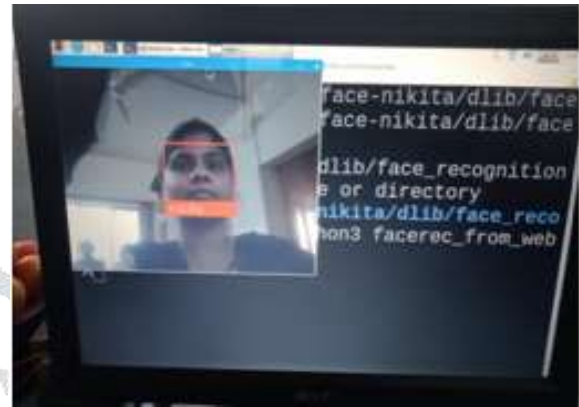


Fig.10. Face detection – Using FASTER RCNN

INDEX	METHOD	TIME (S)	MIN DISTANCE TO DETECT
1	HAAR CASCADING	6	50 cm
2	FASTER RCNN	1.2	46 cm

Table .2. Comparision result – HAAR cascading and FASTER RCNN

Fig.9 .shows face detection using HAAR Cascading and Fig.10. shows face detection using Faster RCNN. As above result shows that Faster RCNN gives better result as compare to HAAR Cascading.



Fig.11. Show name of student



Fig.12. Showing- Student name , date, time

V.CONCLUSION

There are various types of methods like RFID, fingerprint to take attendance. Faster RCNN algorithm is new version of convolution neural network. This is real time object detection technique. This algorithm gives good result as compare to another. Automatics attendance system is useful for colleges, hostel and big management systems. This system is also used for current covid-19 situation for maintaining the records. This system provides better results and less time consumption as compare to another. This Attendance Management System is a solution to all the problems related to the attendance, message, fee status.

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