

Automatic Attendance Management System under Unconstrained Video using Face Recognition

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Abstract: Attendance Management System under unconstrained video using face recognition technology has made a great variation from the traditional method of attendance marking system. This attendance management system has been developed under the domain of Deep Learning by using Face recognition. Automatic Attendance Management under unconstrained video using face recognition systems which automatically mark attendance by detecting end to end face from the frames obtained from live stream video of surveillance camera which placed in center of the classroom. From the recognized faces, it will be compared with stored images in database, then the attendance report will be generated and it also provides attendance reports to parents of the absentee's student.

Keywords: Automatic Attendance system, Attendance marking, Face recognition, Deep learning.

I. INTRODUCTION

Attendance marking is one of the major challenging tasks for the maintaining the record of the students or employees. Now a day's also the traditional method of marking attendance is followed using a stationary item. Attendance marking has been developed as a Fingerprints, Eye Iris, etc. Even though the developed methods also have some disadvantages while marking the attendance. Our project uses the face recognition technique for the automatic attendance marking in the schools, colleges and offices etc. For face recognition, there are many challenging tasks for the developer such as changes in posture, changes in illumination, occlusion and expression changes. When these factors occur in face recognition; it may affect the process of face recognition. To reduce this problem, the modules are developed for face detection, face preprocessing and face recognition. Initially the student's face should be collected, then store in the database with the facial features or facial attributes.

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Using the datasets of the student's face, the trained should be done with the deep learning method of Faster R-CNN method then model has been developed for face recognition. The live video stream is input for the model which some pre-processing such as video is broken into frame for each second then frames are given as input to the model. It will detect the face from unconstrained video of frame, then faces are recognized by proposing face matcher compared with the database. After the face recognition, attendance will be marked on the excel sheet, then send the attendance report of absentee student's parents or guardians.

II. LITERATURE REVIEW

The Attendance marking system has been developed by the different way of techniques with different technologies. Many references are taken from various case studies and it describes the different ways of technologies are used for attendance marking as automatically. Most of the references describe the face recognition, fingerprint scanner, Eye iris, Signature and Voice are used for marking the attendance as automatically

A. Attendance Marking System based on Face Recognition

The Attendance marking system becomes smart by using the concept of Face recognition; it provides a solution for attendance marking in schools, colleges and work places. The task of extracting the face image from live time background image is challenging.

To detect live time face are used and simple fast Principal Component Analysis (PCA) are used to find the faces detected with a high accuracy rate. The similar face is used for marking attendance of the employee. This system manage the attendance details of employees automatically.

B. Using Viola-Jones algorithm and Fusion of PCA and ANN Face Detection and Recognition

The proposed idea is implemented in two stages. The initial part is to detect the face of human in an image using a viola Jones algorithm, then the next part is to recognize the face of the detected face image using a Principle Component Analysis and Feed Forward Neural Network.

The efficiency of the proposed system is compared with existing methods. This methodology gives better performance in recognition is mentioned in the proposed method. The digital ID-Face-Database is used as a primary image database for matching the detected face.

C. Face Recognition Based Attendance Management System

Attendance management using Face recognition system is a task of identifying the students face for taking attendance by using face biometrics based on high -

definition monitor video and other information technology. In my face recognition project, a computer system will be able to find and quickly identify human faces and precise videos or images that are being recorded through a surveillance camera.

Various techniques and algorithms are developed for improving the efficiency of face recognition although the concept to be implemented here is Deep Learning

D. A Review journal for Attendance Marking System based on Face Recognition

The Attendance Management system is one of the real-time challenging tasks. Marking attendance is tough in the huge classroom where there are large amount of students attending the class. Even though there are issues in an attendance management system using face recognition and many research are going on to improve the system. This review paper does not give literature review on earlier work and it also provides discussion about Principal Component Analysis and others

E. Automatic Attendance Management Systems Using Real Time Computer Vision Algorithms

This paper described about the Attendance management system using Computer vision algorithms. This system uses a Learning Management System (LMS), which make automatic face detection and registering the student's name as a present. It is a combination of machine learning with adaptive methods for tracking the facial changes of students during class period, then it will not interfere the regular teaching process and consuming less time compared to traditional method. At last it shows the results with more detailed reports of student activity and attendance of the class.

F. Manual marking system

Even now a day, the traditional method of marking attendance has been followed many schools, colleges and offices, etc. Manual marking system is the manual entry of attendance of the staff member or admin of the organization. Here the attendance will be taken in hand written register. Maintaining the attendance records is very tedious job for the faculty. The retrieval of the information is not as easy as maintained in the registers in the organization.

III. PROPOSED SYSTEM

All Educational institutions are concerned about digitalizing the attendance marking system. The staff member or admin of the organization marking the attendance in traditional way, then attendance will be entered in the system as manually to digitalize the attendance record. In developing the project, we have to choose the algorithm and it should give a good efficiency for detection and recognition of face. Some of the reference has been taken from the various papers to choose algorithm. For that comparison of algorithms is goes under the case study for object detection..For object detection, Fast R-CNN, R-CNN, YOLO and Faster R-CNN have been used in different case study. From that we are going to choose a better algorithm for face detection and recognition

IV. EXISTING SYSTEM

A. Histogram of oriented gradients (HOG)

HOG technique is used for the object detection as well as face detection. It will perform the images are converted into grayscale and every pixel of the images is changed as an integer. Every pixel values are compared with its neighboring pixels. The process is used to find the dark regions of the face in the image. It shows the direction pointing to that dark region and it have a white arrow pointing towards it. The process is done for each pixel of the image.

B. Student recognition System based on Fingerprint

In attendance system based on Fingerprint system which is build with the fingerprint of the students earlier. The fingerprint should be configured before or after the lecture hours and it will be recognize the fingerprint with the database then mark the attendance for the day. The problem for this system is that when the attendance marking of the students will distract at the lecture time

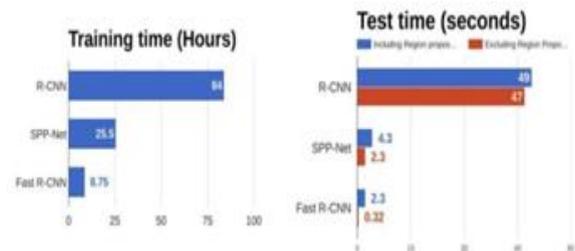


Fig.1. Comparison of Testing and Training for CNN

From the graph in Fig. 1, it is an evidence for training and testing part which shows that Fast R-CNN is faster when compared to other R-CNN algorithm.

Table I: Test time per image comparison

	YOLO	R-CNN	Fast R-CNN	Faster R-CNN
Test time per image	1.6 sec	50 sec	2 sec	0.2 sec
Frames per second	45	2000 (region)	0.5	7
mAP	57.9	66.0	66.9	66.9

From Table I, comparison between YOLO Fast R-CNN, R-CNN, and Faster R-CNN in which Faster R-CNN has less time consuming for testing the image. The YOLO consumes 45 frames per second and it can detect the image for 1.6 Sec.

Table II: comparison between Performance and Speed

Method	mAP	FPS	Batch size	#Boxes	Input resolution
Faster R-CNN (VGG16)	73.2	7	1	~6000	~1000 x 600

Fast YOLO	52.7	155	1	98	448 x 448
YOLO (VGG16)	66.4	21	1	98	448 x 448
SSD300	74.3	46	1	8732	300 x 300
SSD512	76.8	19	1	24564	512 x 512
SSD300	74.3	59	8	8732	300 x 300
SSD512	76.8	22	8	24564	512 x 512

In the above Table II, the performance and speed for fast detection. The data set of PASCAL VOC is used popularly for YOLO models in that Fast YOLO proves to be faster. When the YOLO is compared to other detectors with GPU implementation, it shows a speed of detectors and relative maps they are used to compare the accuracy and analyze performance. For the data set of PASCAL VOC, Fast YOLO is the fastest detector.

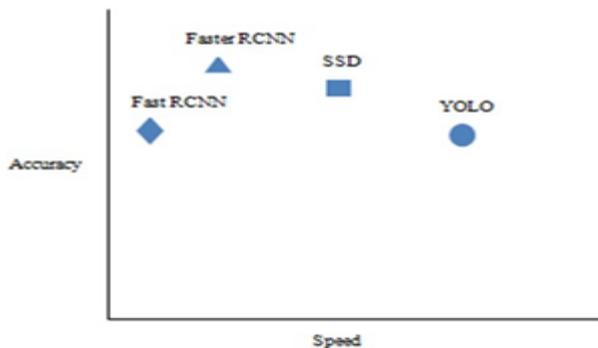


Fig. 2. Speed Vs Accuracy

From the above Fig 2 shows that Faster R-CNN is the best algorithm if we want accuracy move for Faster R-CNN otherwise choose the Fast YOLO algorithm. In this journal paper, we propose an automatic attendance management system using deep learning technology. This method, which use face recognition and detection algorithms, to automatically detects the students face from a surveillance camera as live stream video then recognize and mark the attendance. Marking the attendance using the traditional method is a very tedious task and also the chance of redundant attendance, and is highly inefficient. Make a move to how face recognition modem's works..

A. Module and their work

This project is developed with the GUI using Flask. Initially for training, the sample images are taken of all the students in the class in different directions. The images have been trained with the id and name to develop the model.

The model is ready to detect and recognize the face of the students. For each class, the model has been developed for face recognition, then each model are placed for getting video as input when the "Mark attendance" button is clicked. The surveillance cameras are connected to the system with DVR, it provides the live stream video of the classroom which we are selected. The faculty or admin can select the classroom or department for marking attendance automatically, then the faculty or admin selected the classroom; click the "Mark attendance" button. It will give

the live stream video from the surveillance camera as input to the model. The model will get the frame per second of the video then it will detect the face in the frame of the image and start to recognize the face compared with the database. If the students are recognized, it will mark as present, otherwise it sends the attendance report of the absentee's student to the parent or guardian.

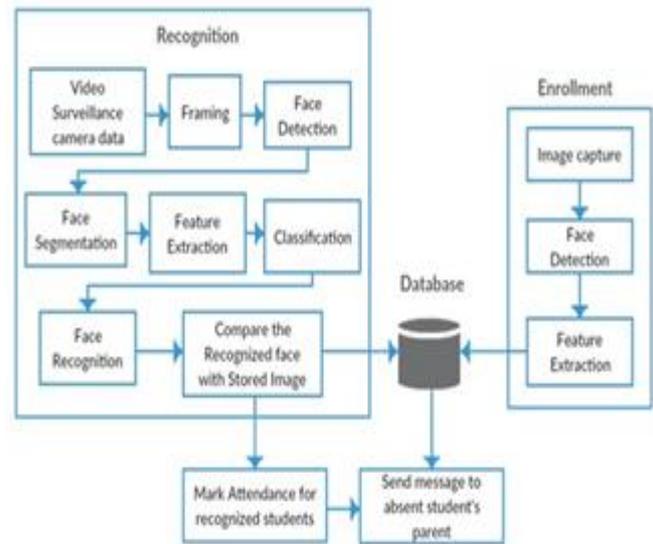


Fig. 3. Architecture diagram for Face recognition

B. Detection of Face

Detection of face is an vision of finding the faces (size and location) in a frame of the image and probably extracting faces from it then used for face recognition algorithm.

C. Recognition of Face

The face images already extracted, cropped and converted into grayscale, then the face recognition algorithm will responsible to find the id and name.

For face recognition, the comparison will be performed with the database for relating with the input frame image, then it will be identify the all facial image id's and names for marking attendance. After recognizing the faces of the students, then it will be mark the attendance automatically in the excel sheet. If the student is absent, then the attendance report of the student will be sent to the parent or guardian.

D. Algorithm used

Faster R-CNN algorithm is used here, which has an best speedup solution is integrated with the region proposal algorithm into the CNN model. Faster R-CNN is performing the same thing which build the unified single model composed to RPN and Fast R-CNN with split convolutional feature layers. The model workflow is the CNN network perform the image classification tasks, then Region Proposal Network is used for fine-tune the task for image classifier. It has a condition such as Intersection-over-union (IoU)>0.7 when negative samples have IoU<0.3. Make small n x n spatial window for conv feature map of the entire frame of the image then we have to predict numerous regions of various scales and ratios simultaneously After the predicting the multiple regions, train a Fast R-CNN with current RPN.

Use the Fast R-CNN network for initializing the RPN training. At the time, RPN and the detection network have shared convolutional layers, then finally unique layers of Fast R-CNN will fine-tune. Repeat the training to RPN and Fast R-CNN alternatively then the Faster R-CNN can develop as model for face recognition

V. CONCLUSION

Thus the aim of this paper is to mark attendance of the student from the recognized students face obtained from the live stream unconstrained video under domain on deep learning; the face is detected and recognized with the help of Faster R-CNN algorithm. This system is build in camera and computer, so no need for specialized hardware for installing the system in the organization. The main motive behind developing this system is to mark attendance and share the attendance details to the student's parent automatically when the student is absent without any help of human power. In future, this system can also be implemented in other places like schools, office and where attendance is required. The usage may help the ontime attendance on one click and also the regularity can be viewed.

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