

HAAR CASCADE ALGORITHM FOR FACIAL RECOGNITION

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Abstract:

To maintain the attendance record with day to day activities is a challenging task. The conventional method of calling name of each student is time consuming and there is always a chance of proxy attendance. The following system is based on face recognition to maintain the attendance record of students. The daily attendance of students is recorded subject wise which is stored already by the administrator. As the time for corresponding subject arrives the system automatically starts taking snaps and then apply face detection and recognition technique to the given image and the recognize students are marked as present and their attendance update with corresponding time and subject id. We have used deep learning techniques to develop this system, histogram of oriented gradient method is used to detect faces in images and deep learning method is used to compute and compare feature facial of students to recognize them. Our system is capable to identify multiple faces in real time.

Introduction:

The technology which is being used around the world is making the process more simple and faster for humans. So we noticed that the attendance marking is being a bit complex process even after using some technology like finger print scanner or the manual attendance marking so we thought to implement a simple and elegant solution for automating the attendance and make it a much easy process for students and faculty. By taking up this process it may save another 10 to 15minutes for the faculty and students in the class. A lot of technology is been made in this world which made the complex process easy. Amongst these include the Bio-metric and Face Recognition based security and attendance systems. This advanced Face recognition attendance system marks the attendance by identifying the features of the face so its accuracy and precision is really high as it uses the features of the face which includes the eyes nose ears and the structure of our face so it cannot be manipulated to get the false attendance. For this process first the pictures of the people whose attendance needs to be taken is updated in the database as people may have glasses and men may

grow hair so their pictures will be taken multiple time so that the problem of not able to identify the face does not show up. After that we take the attendance just by passing through the camera looking it so it becomes so simple. The chance of getting an error in this process is so less as it uses the face features to identify. The goal of the project is to build an independent and automated attendance system which provides teachers with a time saving solution for the taking attendance. As experienced daily in the classrooms that attendance can usually take up to ten minutes of the lecture time and often is extended to the time in between classes, which in turn results in students getting late for their other classes. If we can come up with a solution to automate a process, while the class is going on, then time saving can be established. Even biometric attendance requires students to form a line and wait for their turn to give attendance which again disrupts the decorum of the class. So, if in some case if the attendance can be taken when the student is entering the class itself, then we can achieve more efficiency in the class.

Objective Of the System:

This project presents an automated system for human face recognizing progressively for Schools and Universities to check the attendance of their students. So Smart Attendance utilizing Real Time Face Recognition is a true arrangement which accompanies everyday exercises of dealing with students. The manual undertaking of attendance is too monotonous and much tedious. Utilizing Face acknowledgment with restricted computer power is as yet a test. To identify human face, Haar Cascade is being used and SVM calculation is used to identify the faces of the students with a high accuracy rate. The matched face is then used to check the attendance in a excel document, which will be shipped off individually to the staff through email (utilizing SMTP Protocol). This procedure gives considerably more accurate analysis with exact outcomes in user interactive manner than existing attendance and leave management system. Indeed, even biometric attendance expects students to frame a line and trust that their turn will give attendance which again disturbs the respectability of the class. In this way, if for some situation if the attendance can be taken when the student is entering the class itself, at that point we can accomplish more effectiveness in the class. The system is tried for different use cases. We consider a particular zone, for example, study hall attendance to test the precision of the system. The measurement considered is the level of the perceived appearances per complete number of tried countenances of a similar individual. The system is tried under changing lighting conditions, different outward appearances, presence of fractional countenances (in thickly populated rooms) and presence or nonattendance of beard and glasses. An expanded exactness (almost 100%) is gotten in a large portion of the cases considered.

BENEFITS Automated time tracking system Automation simplifies time tracking, and there is no need to have personnel to monitor the system 24 hours a day. To err is human, and with automated systems, human error is eliminated. A time and attendance system using facial recognition technology can accurately report attendance, absence, and overtime with an identification process that is fast as well as accurate. Labor cost savings Facial recognition software can accurately track time and attendance without human error. It keeps track of the exact number of hours an employee is working, which can help save the company money. You will never have to worry about time fraud or "buddy punching" with a facial recognition time tracking system. Tighter security Facial biometric time tracking allows you to not only track employees but also add visitors to the system so they can be tracked throughout the worksite. Access can be denied to any person not in the system. If an incident should occur, facial recognition software can provide evidence for an investigation with a scanned image of a person or persons who have entered the area. Time saving and reduced contagion When contagious illnesses such as colds and viruses spread throughout the workforce, it can increase the incidence of employee absences and significantly reduce productivity. With facial recognition, employees can enter and leave the facility in considerably less time. There is no need to touch the surface of the system to clock in or out. This saves time, as well as minimizing the spread illnesses due to physical contact. Ease of integration Biometric facial recognition technology can be easily programmed into your time and attendance system.

Proposed System:

The proposed system uses Soil moisture sensor, humidity and temperature sensor (DHT11) and rain detection sensors along with DC motor and PIR sensor are used. This DC motor is connected to a water pump which pumps water to the crops when the DC motor is ON. The soil moisture sensor senses the moisture level in the soil.

LITERATURE SURVEY:

1 Yohie Kawaguchi et.al proposed a system based on continuous observation and using face recognition. The author presented a system with an active student detecting method (ASD) having two cameras placed on the wall in which one is a sensing camera which is used for estimating seat inside the class and the other is capturing camera which is used for face detection. They have proposed a shooting plan in which one seat is estimated from the seating area obtained by ASD and then directs the capturing camera to the seat and captures an image. The existence of students is estimated using background subtraction and inters frame subtraction. The author has solved the linear sum assignment problem to give the correspondence of students and seats.

2 Introduced an automated system based on convolutional neural networks. The author has used the GSM module to send the generated attendance report to an authorized person. The author proposes The modified convolutional neural network by adding two normalization operations to two of the layers. This operation provides the batch normalization acceleration of the network. The face recognition system is designed using the SIFT algorithm. This system will take attendance using MATLAB. The image will be captured and matched with the database and SMS is sent to the authorized number. major steps performed in this approach for generating the features are scale-space extreme detection, keypoint localization, orientation assignment, keypoint descriptor. As soon as the face is recognized by the system LED on the Arduino board will start blinking.

3 In author studied two-stage hybrid face detection scheme which uses the probability- based Face Mask PreFiltering (PFMPF) and the pixel-based hierarchical Feature Ad boosting (PBHFA) method. This approach is aimed to solve the problem in Haar cascade. The author proposed a system with two phases, training phase, and testing phase. In the training phase, they presented two main steps first is face detection in which they have used the viola jones algorithm. the second step which is feature extraction after detecting faces from a video feature is extracted using the PCA algorithm. in the testing phase, the data set is partitioned into two parts named training dataset and testing dataset.

4 In the author used the convolutional neural network (CNN) to obtain low dimensional features as the pre-processed images are too high dimensional for a classifier to take it as input directly. For face detection, they have used the viola and jones algorithm and then used correlation tracker to track face from frame to frame. In this paper, the author has worked on several parameters like pose estimation, sharpness, resolution, and brightness. The head position is determined using three-angle roll, yaw, and pitch. Then approach includes final score .

5 In the author presented the system which used the Eigenfaces approach for face recognition. They have performed face detection followed by a cropping of faces then worked on background subtraction for

greyscale images and binary images. The author has used the Eigenface method due to its simplicity, speed, and learning capability.

6 In Savitha et al proposed the system which uses skin detection technique for face detection. after the skin is detected skin pixels are taken and the rest of the pixels in images will be made black. Then these skin pixels will be used for face detection authors have used two databases, the first database is for storing faces of students and the second database is for storing data of students.

7 In another implementation of a similar system, Kawaguchi et al, proposed a model in which the faces are compared to the images in a database along with the fixed seating positions. This is a method of continuous examination which uses video streaming camera to sense the presence of the students in the class. They even estimated the seating arrangements using several different types of calculations. It isa very common architecture, which implemented using two different cameras, one is used to sense and the other one is used to capture images. MuthuKalyani et al proposed a different approach tothis, by using Android Devices to accomplish this task. This was done by the linkage of the android phone to the CCTV camera. After the picture being captured in the camera, it was then exposed to 3D modeling and canonical techniques were used on the pictures for the comparison.

8 The facial detection model proposed by Kruti Goyal et al., is a facial detection model which is built using different types of algorithms like AdaBoost, Haar Cascades. This model uses MATLAB and OpenCV for its implementation. Extraction of facial features is done as a localization of the face which is performed using pattern recognition.

9 Nusrat Mubin Ara et.al in their paper have discussed about the developments in the field of technology they used, such as face detection, normalization, face recognition, and neural networks. The authors also wrote about the methodology in which face detection is done using History of Oriented Gradients, Face Alignment using face landmark estimation, extracting features using Convolutional Neural Network and lastly generating embedding. Although their system found some false predictions, they achieved an accuracy of more than 95%. Samuel Lukas et.al in their Student Attendance system integrated the recognition system with Discrete Wavelet Transform (DWT), Discrete Cosine Transforms (DCT) and Radial Basis Function Network (RBFN), along with their respective mathematical equations. They have represented the system design of their proposed framework with the help of a block diagram to show the process flow. According to their experiment result, they attained an accuracy of 82% as some students were recognized as others.

10 Principle Component Analysis (PCA), Eigenface, Support Vector Machines (SVM) and Neural Networks and compared them based on their success rate. The authors also wrote about system architecture, stepby-step methodology and supported it with its algorithm. They have also provided a mathematical model using mathematical concepts and language.

11 Abhishek Jha et al. proceeded further to a superior system for the recognition process by utilizing statistical methods PCA and LDA in addition to likewise comparing the picture taken and the saved images for marking the attendance. They suggested to the extensive and blunder inclined procedure of participation making which whenever bargained may influence the understudy definitely. They proposed a framework for figuring the pictures in a specific procedure with the goal that matches scoring should be possible. While it very well may be accomplished by utilizing certain calculations, like color detection, PCA and LDA. They made many extractions of facial features from the picture for instance framework of face, nose, and eyes and so on. The PDA and LDA make use of the Eigen Values for students' attendance to be marked accurately.

12 A number of works related to Radio Frequency Identification (RFID) based Attendance Systems exist in the literature. In the authors have proposed RFID based system in which students carry a RFID tag type ID card and they need to place that on the card reader to record their attendance. RS232 is used toconnect the system to the computer and save the recorded attendance from the database. This system may give rise to the

problem of fraudulent access. An unauthorized person may make use of authorized ID card and enter into the organization

13 Iris is the another bio-metric that can be used for Attendance Systems. In the authors have proposed Daugrnan's algorithm based Iris recognition system. This system uses iris recognition management system that does capturing the image of iris recognition, extraction, storing and matching. But the difficulty occurs to lay the transmission lines in the places where the topography is bad.

14 In the authors have proposed a finger print based attendance system. A portable fingerprint device has been developed which can be passed among the students to place their finger on the sensor during the lecture time without the instructor's intervention. This system guarantees a fool-proof method for marking the attendance. The problem with this approach is that passing of the device during the lecture time may distract the attention of the students.

15 This paper proposes a model for implementing an automated attendance management system by making use of face recognition technique, by using Eigenface values, Principle Component Analysis (PCA) and Convolutional Neural Network (CNN). student's faces.

Software Requirements

1. IntelliJ IDEA Software

IntelliJ IDEA analyzes your code, looking for connections between symbols across all project files and languages. Using this information it provides in depth coding assistance, quick navigation, clever error analysis, and, of course, refactorings.

2. Open CV Python Software

Open CV is a software which deals with some programming languages like Java, python and C++, this all are readable and useable on different platform including IOS, Android, OS X, Linux and windows. Interfaces for rapid GPU tasks dependent on CUDA and OpenCL are likewise under dynamic advancement. OpenCV-Python is a library of Python intended to take care of PC vision issues

Existing Work

Fingerprint Based recognition system: In the Fingerprint based existing attendance system, a portable fingerprint device need to be configured with the student fingerprint earlier. Later either during the lecture hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may distract the attention of the students. **RFID(Radio Frequency Identification) Based recognition system:** In the RFID based existing system, the student needs to carry a Radio Frequency Identity Card with them and place the ID on the card reader to record their presence for the day. The system is capable of to connect to RS232 and record the attendance to the saved database. There are possibilities for the fraudulent access may occur. Some are students may make use of other students ID to ensure their presence when the particular student is absent or they even try to misuse it sometimes

Iris Based Recognition System:

In the Iris based student attendance system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of student stored in the database and the attendance on their presence needs be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in maintaining the student records safe. It is a wireless biometric technique that solves the problem of spurious attendance and the trouble of laying the corresponding network.

Face Based Recognition System:

The facial recognition technology can be used in recording the attendance through a high resolution digital camera that detects and recognizes the faces of the students and the machine compares the recognized face with students face images stored in the database. Once the face of the student is matched with the stored image, then the attendance is marked in attendance database for further calculation. If the captured image doesn't match with the students face present in the database then this image is stored as a new image onto the database. In this system, there are possibilities for the camera to not to capture the image properly or it may miss some of the students from capturing.

Working Model

Before tracking the images of students, we need to train every student image with a particular id and name. The process can be done as follows, After running the code it will show a GUI in that we required to enter our Id (only numbers are acceptable) and name of the student after entering both we have to click the take image button after pressing the button it will access the webcam directly and scan the face, After scanning the face we have to press the train image button after pressing the button the images will be trained with theid and name of that particular student, now the images will be stored in the database(folders)with a name and id.

Now after the training process done, we need to press the track image button, After pressing the button it will directly access the webcam and scan the face and check the database if the face is matched with the image stored in database with a particular id and name. Once its matched it will directly show the name and id of the student and send a excel sheet with the name, id, time and date to the respective faculty so that they can directly check whether the student is present or not, Manually doing this task take a lot of time, so by this project we can reduce the effort and time of the faculty.

Proposed Methodology

This project presents an automated system for human face recognition in real-time for colleges and Universities to mark the attendance of their students. So Smart Attendance using Real Time Face Recognition is a real-world solution which comes with day to day activities of handling students. The manual task of marking attendance is too tedious and much time consuming. Using Face recognition on anedge device with limited computing power is still a challenge. To detect real time human face, Haar-Cascade is used and SVM algorithm is used to recognize the faces detected with a high accuracy rate. The matched face is then used to mark attendance in a text file, which will be sent to respective faculty via email (using SMTP protocol). This product gives much more solutions with accurate results in user interactive manner rather than existing attendance and leave management systems.

Results

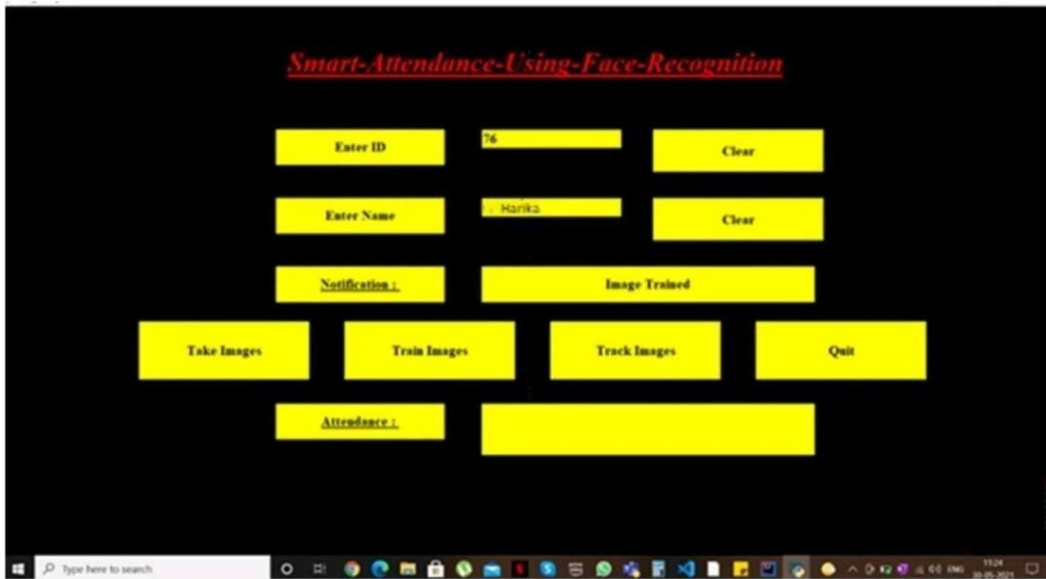
GUI & INPUT DETAILS



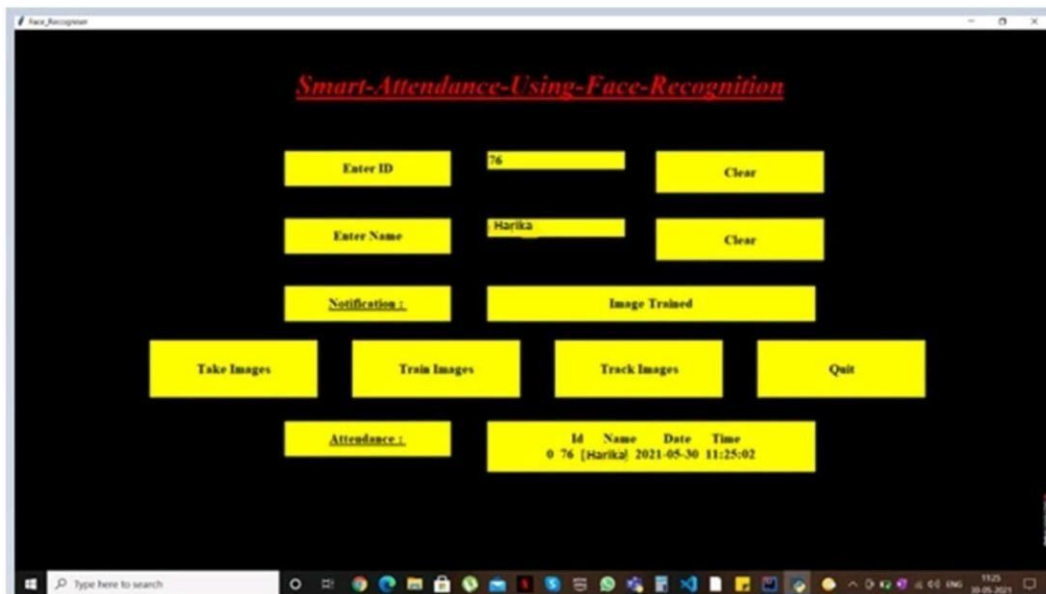
IMAGES SAVED



RAINING IMAGES



ATTENDANCERECORDED



Conclusion

By this Project the faculty can view exact date and time of attendance given by each student. The faculty can know students who is coming late. The Excel sheet will be posted into faculty mail automatically which provides teachers with a time saving solution for the taking attendance. As experienced daily in the classrooms that attendance can usually take up to ten minutes of the lecture time.

References

1pyimage search, <<http://www.pyimage search.com/2018/06/25/raspberrypifacerecognition/>>.

2Xiaoguang Recognition", Dept of Computer Science & Engineering, Michigan State University, 2016.

3Olegs Nikisins, Rihards Fuksis, Arturs Kadikis and Modris Greitans, Raspberry Pi", International Conference on Image Processing and Control Engineering, 2015.

4Rainer Lienhart and Jochen Maydt. An extended set of haar-like features for rapid object detection. In Image Processing. 2002. Proceedings. 2002 International Conference on, volume 1, page 1-1. IEEE, 2002.

1 Dong chen He and Li Wang. Texture unit, texture spectrum, and texture analysis. IEEE Transactions

6X. Wang, T. X. Han, and S. Yan. An hog-lbp human detector with partial occlusion handling7M. Turk and A. Pentland. Eigenfaces for recognition. Journal of Cognitiven Neuroscience, 3(1):71-86, Jan 1991

8Lawrence Sirovich and Michael Kirby. Low- dimensional procedure for the characterization of human faces. Josa a, 4(3):519-524, 1987.

9Takeo Kanade. Computer recognition of human faces, volume 47. Birkh·-auser Basel, 1977.

10S Mar celja. Mathematical description of the responses of simple cortical cells. JOSA, 70(11):1297- 1300, 1980.

11B. K. Mohamed and C. Raghu, " Fingerprint attendance system for classroom needs," in India Conference (INDICON), 2012 Annual IEEE. IEEE, 2012, pp. 433-438.

12T. Lim, S. Sim, and M. Mansor, " Rfid based attendance system," in Industrial Electronics & Applications, 2009. ISIEA 2009. IEEE Symposium on, vol. 2. IEEE, 2009, pp. 778-782.

13S. Kadry and K. Smaili, "A design and implementation of a wireless iris recognition

attendance management system," Information Technology and control, vol. 36, no. 3, pp. 323-329, 2007.

- 14T. A. P. K. K. L. P. M. L. M. P. A. W. G.D. P. J. G.. RoshanTharanga, S. M. S. C. Samarakoon, "Smart attendance using real time face recognition ," 2013.
- 15P. Viola and M. J. Jones, "Robust real-time face detection," International journal of computer vision, vol. 57, no. 2, pp. 137- 154, 2004.
- 16W. Zhao, R. Chellappa , P. J. Phillips, and A. Rosenfeld, " Face recognition: A literature survey," Acm Computing Surveys (CSUR), vol. 35, no. 4, pp. 399-458, 2003.
- 17T. Ahonen, A. Hadid, and M. Pietik"ainen, "Face recognition with local binary patterns," inComputer Vision-ECCV 2004. Springer, 2004, pp. 469-481.
- 18N. A. I. Q. S. Z. Rameez Qasim, M. Mutsaied Shirazi, "Comparisonand improvement of pea andlbp efficiency for face recognition ," 2013.
- 19M. 0. Faruqe and M. Al Mehedi Hasan, "Face recognition using pea and svm," in Anticounterfeiting, Security, and Identification in Communication, 2009. ASID 2009. 3rd International Conference on. IEEE, 2009, pp. 97-101.
- 20Yohei Kawaguchi, Tetsuo Shoji, "Face Recognition-based Lecture Attendance System", "3rd AERU... ", 2005.
- 21B. Kavinmathi, S.Hemalatha,"Attendance System for Face Recognition usingGSM module", 4th International Conference on Signal Processing and Integrated Networks", 2018.
- 22Ketan N. Mahajan, Nagaraj V. Dharwadkar," Classroom attendance system using surveillance camera", International Conference on Computer Systems, Electronics and Control",2017.
- 23 Shubhobrata Bhattacharya, Gowtham Sandeep Nainala, Prosenjit Das, Aurobinda Routray "Smart Attendance Monitoring System (SAMS): A Face Recognition based Attendance System for Classroom Environment", IEEE 18th International Conference on Advanced Learning Technologies, 2018.
- 24 E.Varadharajan, R.Dharani, S.Jeevitha,.. " Automatic attendance management system using face detection", 2017.
- 25 Guo, Jing-Ming, "Complexity reduced face detection using probabilitybased face mask prefiltering and pixel-based hierarchical-feature Ada boosting ", Signal Processing Letters, IEEE 2011.
- 26 K. Senthamil Selvil , P.Chitrakala, A.Antony, Jenitha S, "face recognition based attendance marking system", International Journal of Computer Science and Mobile Computing, 2014.
- 27 Chen, Joy long Zong. "Smart Security System for Suspicious Activity Detection in Volatile

Areas." Journal of Information Technology 2, 2020.

28Jacob, I. Jeena. "Capsule network based biometric recognition system." Journal of Artificial Intelligence 1,2019.

29Kirtiraj Kadam, Manasi Jadhav, Shivam Mulay, Tushar Indalkar, "Attendance Monitoring System Using Image Processing and Machine Learning", International Journal of Advance Engineering and Research Development, 2017.

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