Review Paper on Contactless Attendance System based on Face Recognition

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Abstract - *Attendance tracking is fundamental to all associations. The attendance management system has seen critical change over a brief period from manual registers to hi-tech smart attendance tracking mechanisms. Face recognition is a simple and secure method of gauging attendance. The gadget captures the facial impression of individual and process the information into a secure database. When enrolled the gadget perceives the matched face for all future check-ins. The automatic recognition of faces caught by computerized cameras in unconstrained real time environment is extremely testing, since it includes varieties in acquisition just as in facial expressions and impose changes. The motivation behind this exploration is to fundamentally examine just as assess past works on attendance management system dependent on face recognition. Mathematical aftereffects of the foremost intriguing methods are given alongside the setting of trials and difficulties took care of by these strategies. This article gives the literature review as well as supports conversation and proposal for future work.*

Key Words: **Facial Recognition, LBPH, OpenCv, Fisher Face, Dominant Rotated Local Binary Pattern, Convolution Neural Network.**

1. INTRODUCTION

Organizations (educational or otherwise) are concerned with the regularity in attendance nowadays. The overall performance of the employees/students is primarily determined by their cognizance and presence at the premises. With the ongoing research and development in the field of pattern recognition and computer vision, for instance, the applications like biometric authentication, face and fingerprint recognition, face-mask detection (especially during the COVID-19 pandemic) are key and pivotal in implementing and managing the e-attendance systems.

Human face recognition has been a front-runner and remarkably effective system in biometric verification for many applications such as door control, video monitoring system, network security, and human computer interactions. The interest and time frame of studies in this field are highly indicative of its value and complexity, hence inevitably becoming a predominant form of biometric authentication.

Usage of the face recognition for the purpose of attendance marking represents the smart way of enabling the attendance management system. Face recognition is more accurate and comparatively faster technique than its counterparts. Face recognition provides a passive identification, i.e., a person which is to be identified does not necessarily have to conduct any action for reporting his/her unique identification, instead, the robust system effectively captures the frames via the live stream, further enabling precise and infallible recognition. The facial recognition system is a real-time and contact-less attendance tracking software exceptionally relevant in the current pandemic situation. Organizations are seeking ways to provide a COVID-free workspace to employees, and a touch-less check-in is the first step towards it.

Not at all like other sorts of biometric framework such as fingerprints that captures personality through touch a facial recognition framework could be a contactless way to oversee representative and employees. In times of the COVID-19 widespread, a contactless framework is a viable preventive degree. It makes a difference oversee the influx and outpouring of individuals in buildings and premises in a secure and productive way.

Distinctive approaches of confront acknowledgment for still picture can be categorized into three main groups such as all encompassing approach, feature-based approach and hybrid approach.

All-encompassing approach: In all-encompassing approach the total confront locale is taken as an input in face discovery framework to perform confront recognition.

Feature-based approach: In feature-based approach neighborhood highlights on face such as nose and eyes are sectioned and after that given to confront detection framework to simpler the errand of face recognition.

Hybrid approach: In hybrid approach both neighborhood highlights and the complete confront is used as the input to face detection framework.

[15]The operation of confront coordinating can be executed in abundant of ways with the assistance of numerous calculations. The algorithms which are famously recognized in making a difference of detection of understudies are as takes after-'Eigen Face', 'Fisher Face', 'LDA'. There working may vary and end comes about gotten will too be

subordinate upon the application i.e. whether it is utilized for single confront recognition or it is utilized for different confront acknowledgement.

There is a part of constraining on the research done in the past. The detail of the confinements will be presented in another part of writing overview. The writing audit gives summaries of data about the past research and how each research executes the attendance management framework by using confront recognition.

2. LITERATURE REVIEW

V. Kurniawan et.al [1] executed attendance framework utilizing Eigen face algorithm for face recognition. The attendance system is constructed utilizing Android and web innovations with geographical positioning extraction highlight and biometric innovation: the face recognition. Notwithstanding that, Euclidean distance is utilized for figure the distance between input image and the training image. There are factors in this examination that may upset the recognition cycle: lighting, distance between the face and the camera, and equipment particulars, which are not mulled over. The test outcomes show that more training images indeed deteriorate the exactness level of the framework, which is 86.67% for five training images and drops to 68.89% for ten training images. It likewise has been demonstrated in the testing that the framework neglects to perceive the face as a result of low lighting condition.

R. Samet et.al [2] a filtering framework based on Euclidean distances calculated by three face recognition procedures, to be specific Eigen faces, Fisher faces and Local Binary Pattern has been produced for face recognition. The proposed system incorporates three distinct applications for educators, students, and guardians to be installed on their advanced cells to oversee and perform a real-time polling process, data tracking, and reporting. In the proposed framework, RESTful web services were utilized for communication among educators, student, and parent applications and the cloud server. Forty diverse attendance checking tests were acted in a real classroom, including 11 students, and 264 students' faces were identified. An examination of detection and recognition precision of every one of the three distinct sorts of tried calculation was made inside the paper.

E. Rekha et.al [3] implemented an effective automated attendance framework by incorporating the face recognition innovation utilizing Eigen Face database and PCA algorithm using MATLAB GUI. To conquer different confinement in actualizing face recognition advances like Image Quality, Image Size, Face angle, varying intensity of lights different procedures like Illumination Invariant, Histogram Equalization and PCA are utilized. Test face and recognized face is coordinating with comparability score equivalent to 0.4. On the off chance that comparability score is not as much as threshold estimation of 0.3 the face isn't recognized. After

face recognition attendance is consequently refreshed in Microsoft Excel sheet.

P. Wagh et.al [4] evaluated multiple face recognition system for classroom attendance utilizing Viola Jones for face detection reason and Eigen Face for face recognition. For the face recognition the concept of determination of locale of intrigued is utilized and the faces are confirmed one by one utilizing the Eigen Face method. They have specified comparison of distinctive face recognition algorithms within the paper. The creators have found the arrangement for light intensity issue and head posture issue for which they have utilized the light invariant algorithm.

S. Chintalapati et.al [5] framework is based on LBPH algorithm, since LBPH outperforms other algorithms with a better recognition rate and a low false positive rate. As a classifier, the device utilizes SVM and Bayesian since they are better compared to distance classifiers. The system employed the LBPH algorithm to extract the characteristics and therefore the SVM classifier for classification purpose. This document used an 80- person database (NITW database) with approximately 20 images of every individual collected for the project. Major risk to the face recognition framework is spoofing. Hence the distributor has included anti-spoofing procedure like eye flicker locator within the framework. This archive sets out a few execution assessment conditions such as false positive rate, distance of object for correct recognition, training time, recognition rate(Static Images), recognition rate (Real time video),impeded faces. The future work is to improve the recognition rate when there are inadvertent changes in an individual. Gait recognition can be intertwined with face recognition in order to realize superior execution of the system.

S. Bhattacharya et.al [6] proposed a framework to evade disadvantages of conventional manual attendance system. The system is created by the reconciliation of pervasive segments to make a versatile gadget for dealing with the students' attendance utilizing Face Recognition innovation. This paper depicts how real time face detection and recognition can demonstrate valuable for attendance marking of students. The face detection is accomplished utilizing Viola Jones algorithm. Face tracking from frame to frame was refined utilizing connection tracker from dlib library. A few boundaries were registered, for example, Pose assessment, Sharpness, Image size, Brightness. Low-dimensional distinct feature from face image was refined utilizing Convolution Neural Network. The system performs decently with various outward appearances, lighting and posture of the individual.

J. D'Souza et.al [7] automated attendance marking and management system is proposed by utilizing face detection and recognition algorithms. Fundamental target of this work is to make the attendance marking and management system completely programmed, basic and simple. In this work the facial recognition of face is finished by image processing

techniques. The processed image is used to match with the existing stored record and then attendance is marked in the database correspondingly. The proposed framework worked dependent on histogram algorithm. This algorithm requires numerous positive and negative images to prepare the classifier. This system contains four modules, for example, Image Capturing, Segmentation of gathering photograph and Face Detection, Face comparison and Recognition, Updating of Attendance in database. This system follows a measured methodology; any headway can be coordinated into the system.

A. Rai et.al [8] discussed a start to finish face recognizable proof and attendance approach utilizing Convolution Neural Networks (CNN), which measures the CCTV film or a video of the class and imprint the attendance of the whole class in a solitary shot. One of the primary favorable circumstances of the proposed arrangement is its robustness against normal difficulties like impediment (incompletely obvious/covered faces), direction, arrangement and luminescence of the study hall. The proposed strategy acquired a constant exactness of 96.02% which is superior to that of the current end-to-end face attendance systems. The constraint of the proposed framework is that it gets baffled for distant faces and furthermore for low resolution recordings. The MTCNN architectonics is inept for faces with their eyes shut which makes this framework limited to faces with eyes open similar to camera.

B. Tej Chinimilli et.al [9] proposed automated attendance management system dependent on Haar cascade for face detection and the LBPH algorithm for face recognition. Situations, for example, face recognition rate, false-positive rate for that and false-positive rate with and without utilizing a threshold in distinguishing obscure people are considered to assess the system. The creator got face recognition rate of students as 77% and its false-positive rate as 28%. The system perceived students in any event, when students are wearing glasses or grown a facial hear growth. Face Recognition of obscure people is almost 60% for both with and without applying limit esteem. Its false-positive rate is 14% and 30% with and without applying limit individually. Little dataset was the impediment of the proposed system. According to the creator an exertion could be made in future to fabricate a superior dataset that may essentially give a more precise outcome.

S. Kakarla et.al [10] a novel CNN architectonics for face recognition framework is proposed including the way toward gathering face data of students. This paper officially presents the job of CNN in Face Recognition and adaption of CNN in attendance posting. Tentatively it is demonstrated that the proposed CNN architectonics gives 99% precision. Further, the proposed CNN structure is utilized to build up a "Smart Attendance Management System (SAMS)", which is an online application, to provide attendance of students utilizing face recognition, progressively. The future extent of the paper is to fabricate a strong application for smart attendance management, for more number of students, progressively.

K. Okokpujie et.al [11] proposed a framework that utilizes Viola-Jones algorithm for face detection and Fisher Face algorithm was utilized to make formats of the appearances that were caught. To decide the precision of the recognition framework, tests were done under different lighting conditions and changing outward appearances and by fluctuating outward appearances and angles alongside lighting conditions. The tests were completed on the points of interest of twelve people put away in the data set. The planned and actualized face recognition framework worked with differing levels of precision. A blend of lighting, facial and precise variables were answerable for the varieties in correctness got from the tests done on the executed plan.

A. Arjun Raj et.al [12] an intelligent attendance framework dependent on face recognition was executed. The framework implemented utilizing LBPH face recognizer to distinguish face of the individual continuously. Raspberry Pi, OpenCv and DLib using python are the essential prerequisites for this framework. A message will be automatically sent to their parents' number using GSM. The creator additionally built up an Android Application utilizing MIT application designer for attendance checking. The creator likewise gave examination of different algorithms for face recognition in which it's obviously expresses that LBPH technique achievement rate is 98.5%. Inside the paper a table with respect to advantages and disadvantages of different methodologies on face recognition is given. To execute the framework the maker required Raspberry Pi 3b module, pi camera, servo engine and database servers. By utilizing LBPH algorithm for face recognition the creator overcome the issue of various head orientations and generous impediment.

N. Tamboli et.al [13] student attendance marking framework utilizing face recognition for high proficient signal transfer system applications was implemented. In this paper DRLBP algorithm is utilized to distinguish overlapped faces detection. The objective of the work was to recognize constantly covering defies one face untruth or connects over and covers some bit of another face in an image. The maker got 95% exactness with overlapped face distinguished when utilized DRLBP feature extraction. When the class picture is added as info picture in automated attendance marking code, it will consequently figure the all out number of students with covered appearances. The code is formed in MATLAB used for coordinating and planning.

N. Gupta et.al [14] student Attendance centralized server structure is characterized to deal with the student's class attending documents utilizing the idea of face detection and recognition through open computer vision. For face detection system the maker utilized Haar cascade and for face recognition LBPH model. . A portion of the python bundles/modules utilizing in the venture are Numpy, Tkinter, OpenCv, PIL, Pandas. The maker utilized face

recognition library with KNN algorithm, which gives 97.35% of precision rate.

E. Varadharajan et.al [15] executed an automatic attendance management system utilizing face detection. The creator portrayed the significance of background subtraction before faces are cropped from the image to improve the precision of face detection. The author suggested the utilization of Eigen Face because of its speed, straightforwardness and learning capacity for face recognition. The archive additionally finished up with the perceptions that if there should arise an occurrence of ladies with a veil the detection and recognition pace of the face was 45% and 10% though that in the event of ladies without a veil it was 93% and 87%. Furthermore for facial hair men the detection and recognition rate was 79% and 65%.

V. Shehu et.al [16] introduces a new automatic attendance marking system, which incorporates computer vision and face recognition algorithms into the cycle of attendance management. This paper tends to issue, for example, real time face detection on environments with multiple objects, face recognition algorithms just as social and educational issues with the applied strategies. To detect face like examples in real time they utilized the HAAR classifiers. After exploratory perceptions they acquired after insights from each caught picture, there were roughly 70% of effectively distinguished countenances and from them just 30% were effectively recognized. Furthermore for first year students, the effective identification rate was a lot higher about 56%.

3. CONCLUSION

Investigation of face recognition has stayed an endeavoring region for scientists for a long time. There are many existing strategies for face detection and recognition, which can classify the given face image by comparing with trained face images. Literature review results the way that Haar Cascade is reliable in all papers concentrated as it gives great detection rate whereas LBPH beats different algorithms with a superior recognition rate and a low bogus positive rate. The ordinary techniques are touchy to lighting, act, brightening because of which exactness of face detection and recognition to some degree debases subsequently connecting for profound learning with the assistance of convolution neural network to fulfill the requirement for the application.

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