

Contactless Attendance for Employees using Different Techniques

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Abstract:- Attendance Management System became tough, intriguing and accurately in real-time system. It is difficult task to manually mark the attendance of members in faculty. In current analysis, many attendance management systems are implemented. The attendance management system using facial features still have some issues in the current research. So, this research analysis helps to boost the present research analysis and create the attendance management system work well. The paper will do a literature review on the previous work from totally different researcher has done on their analysis paper. This paper compares machine learning algorithm and deep learning algorithms. Deep learning is the piece of machine learning which utilizes various layers of neural network that choose classification and prediction. In this part, we study and analyse among various machine learning techniques and deep neural networks for face recognition, by estimating execution. The test results demonstrate that convolution neural network based on deep learning strategy gives the most noteworthy exactness or accuracy like DNN, CNN, Eigenface, FaceNet, OpenFace, SVM than other machine learning algorithms like PCA, LDA, LBP, Harr- Cascade, LBPH. Machine Learning algorithms are Suitable for small dataset but Deep Learning algorithm is efficient for large dataset.

Keywords:- Deep learn algorithms, Face classification and recognition, ML – machine learning.

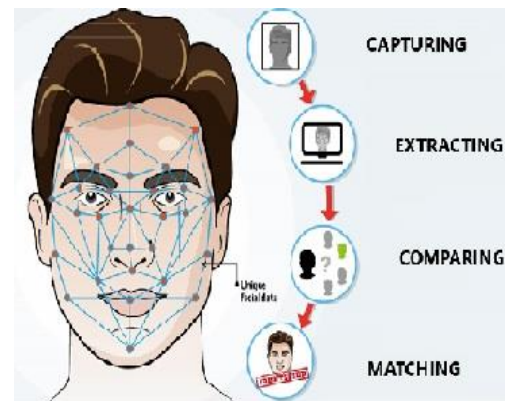
1. INTRODUCTION

Face recognition is the system used for identifying and verifying peoples by their faces. Technology is growing too fast and nowadays everything is becoming automatic for cutting down the human effort. As technology is growing the manual attendance is replaced by modern attendance systems like fingerprint detection, face detection, etc. The existing system like manual attendance is taken in the registers that's why this is a very difficult task for us to keep such records and also Fingerprint biometric attendance system is also taking more time to mark attendance, therefore we are in a need of a contactless automated system for marking and maintaining attendance.

Face detection is the concept for cutting down the human effort like marking attendance manually, detecting people's in-crowd, face detection can be useful in many ways like making attendance system online or automatic, useful for police for detecting a particular person in-crowd,

staff attendance system, etc. Image processing or deep learning can handle large datasets of faces and allowing different models to perform face recognition.

Fig 1: Face recognition system work flow



2. LITERATURE REVIEW

In 2020, Shailender Kumar, Dhruv Kathpalia, and their team proposed a paper titled Convolutional Neural Network-based Automated Attendance System by using Facial Recognition Domain using convolutional neural networks with an exactness of 96.15%. In this paper, the means of highlight determination, extraction, and preparing are finished. Pixel esteems are passed as input to CNN. CNN helps in lessening time and handling power. It additionally builds exactness. This model can likewise be utilized in online classes which is the need of this time [1].

In 2020, Dr. Aruna Bhat and his team proposed a paper on Deep-learning based group-photo Attendance System using One-Shot Learning with the help of a Deep Convolutional Neural Network. This paper utilizes a novel face acknowledgment-based attendance system which can work on class bunch photograph assisting with discovering present student list. The proposed model has a precision of 97% on the LFW dataset and 85% on the student's classroom photograph dataset. This uses the one-shot strategy which will work for new clients by having a solitary picture of them and hence framework extremely proficient and powerful.

This paper will utilize the android interface with all login functionalities [2].

In 2020, Samridhi Dev, Tushar Patnaik proposed a paper on Student Attendance System using Face Recognition. The framework was tried on three unique techniques out of which the KNN technique end up being better with the exactness of 99.27 %. The framework was tried on different conditions which incorporate brightening, head developments, articulations, the distance of students from the camera. The framework faces the assumptions in any event, when the picture contains faces with whiskers and exhibitions and without facial hair and displays. Proposed framework revealed to be superb to perceive faces having two years of distinction. Being tried on these conditions KNN end up being better by accomplishing the general precision of 97 %. [3].

In 2019, Shreyak Sawhney, Karan Kacker, Samyak Jain, Shailendra Narayan Singh, Rakesh Garg proposed a paper titled Real-Time Smart Attendance System using Face Recognition Techniques. This paper proposes a model for executing a mechanized attendance framework for students of a class by utilizing face acknowledgment procedure, by utilizing Eigenface values, Principal Component Analysis (PCA), and Convolutional Neural Network (CNN). In PCA, each image in the preparation dataset is spoken to as a straightly weighted eigenvector called Eigenfaces. The PCA and LDA utilize the Eigen Esteems for student participation to be checked precisely. This strategy changes faces into a little game plan of essential characteristics, Eigenfaces, which are the chief pieces of the fundamental course of action of learning pictures.[4]

In 2020, Tulabandu, Aadithya Kiran, and the team have projected a paper of PCA based Facial Recognition for Attendance System with the help of Principal Component Analysis, wavelet change methods. This uses face recognition which will mark attendance in the classroom without disturbing teachers and will automatically update attendance, this will save time and work. This idea is done with the help of the OpenCV library. According to the paper, the obtained accuracy is over 97%. [5]

In 2018, Radhika.C.Damale and Prof. Bageshree.V. Pathak have proposed a paper on Face Recognition Based Attendance System Using Machine Learning techniques. They have utilized SVM which has an exactness of 87% with the assistance of two component extraction methods PCA (88%) and LDA (86%). They have utilized another calculation MLP which has an exactness of 86.5% which is determined with the assistance of two component extraction methods PCA (86%) and LDA (87%). They have at last utilized the CNN calculation which has the most elevated precision of 98%. The face location is finished by a strong base face detector. [6]

In 2017, Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic proposed a paper titled FaceTime – Deep Learning Based Face Recognition Attendance System using CNNs for advanced results in image classification and object detection. FaceNet, this strategy

utilizes deep CNN for learning mapping from face pictures to Euclidean space where distances match to the face closeness estimations. This outcomes in creating 128-bytes implanting's per face. OpenFace library with pre-prepared FaceNet network was utilized for preparing this profound CNN. The creators of this paper proposed a novel methodology of face enlargement to expand the dataset which could prompt accomplishing higher exactness of 95.02%. The whole strategy of building up a face recognition component by combining state-of-the-art methods and advances in deep learning is elaborated. [7]

In 2020, Vidya Patil, Anushka Narayan, and the team have projected a paper on Automatic Students Attendance Marking System Using Image Processing and Machine Learning. This proposed system investigated image processing along with machine learning methods and techniques high precision and productivity. The framework does the automatically markings of the student's participation dependent on location and acknowledgment of students using face picture highlights. Face recognition is executed by utilizing the Viola-Jones calculation. The precision of LDA+KNN is 97% while LDA+SVM is 95% exactness. Along these lines, the perception says that KNN gives more precision than SVM. [8].

In 2019, Dr. PALANIVEL and the team projected a paper on Automated Attendance Systems Using Face Recognition by K-Means technique. In this paper, they have planned an inspiration for an automatic attending system by face recognition uses K-means Clustering. This procedure comprises of principally 2 areas - the training stage and the testing stage. At that point the SVM Calculation is prepared to train model to predict the face uses these features or highlights. Predictable with the information kept inside the database excel sheet is produced with the name of the scholar present inside the classification. SVM is primarily utilized for classification purposes. To avoid procedure complexness, it uses recognition tools by high dimension. K-means Clustering method, SVM classifier together with Gabor transform and acquires a result with 93% accuracies. [9]

IN 2018, Jules-Raymond Tapamo, Louis Mothwa, and the team proposed a paper on the Conceptual Model of the Smart Attendance Monitoring System Using Computer Vision. In real-time face recognition with periodical updates of the attendance information determines the presence of students during the whole lecture period. In this paper proposed model compares the recognition accuracy of the three feature extraction techniques, Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), Local Binary Patterns (LBP), and the combination of the PCA and LDA. It is observed that the combination of the PCA and LDA using camera achieved the recognition accuracy of 85%. The higher the detection rate, the higher the recognition accuracy [10].

In 2020, Muthunagai Muruganandhan. D, Rajasekaran P these authors have projected a paper on classroom attendance monitoring system using CCTV by using

Principal Component Analysis (PCA), Eigen face value detection, Convolutional Neural Network (CNN) algorithms. The proposed system extracts unique features for automation of the automated attendance system. This technique is aimed at security. This is valuable for both students and teachers. [11]

In 2018, Rudy Hartanto proposed a paper titled Face Recognition for Attendance System Detection utilizing the YCrCb shading framework which makes a partition between the intensity element (Y) and the chrominance component (Cr and Cb). Accordingly, the difference in the climate light power just influences the intensity part of Y and less influences the chrominance segment. Thusly, the recognition precision level doesn't have a lot of distinction. For the recognition cycle, just pixels in the crate will be prepared with the LBPH calculation, in this manner the computing decreases, lighter, and quicker, Haar Course face recognition calculation could distinguish the situation of the face correctly, further to slice the face region as indicated by the size of the case encompassing the face [12].

In 2019, Harish. M, Chethan. P, Prajna. N Holla K, Syed Abdul Azeem, M.G. Veena proposed a paper titled A Smart Attendance System based on Machine learning. The proposed model for taking attendance is viable in lessening additional equipment parts needed to gauge attendance by utilizing Google Drive REST Programming interface, it is

conceivable to computerize the undertaking of transferring and download records from Google drive. All the gadgets needed for this intention are now accessible with nearly everybody in the current day and age. Machine learning for identifying and recognizing faces has been believed to be extremely compelling. As confirmed in the outcomes segment, the proposed work created 100% accuracy reliant on the goal of the cell phone camera with which the picture of the classroom is taken the learning cycle utilizing Triplet loss and back-propagation is done to expand the distance among Anchor and the Negative picture while diminishing the distance among Anchor and the Positive picture. [13]

In 2019, AZM Ehtesham Chowdhury, Omar Khaium Chowdhury, Md. Assaduzzaman Samrat, Md. Zillur Rahman, and Tanvir Ahmed proposed a paper titled HFDCM: A low-cost machine learning based class attendance monitoring system. This paper is essentially centered on checking class attendance system by diminishing error however much as could reasonably be expected. In spite of the fact that, proposed camera model HFDCM worked really hard by taking a preview of every students from different positions so that out of in any event 10 snapshots, the proposed calculation can perceive any student from the snapshots. This paper accomplished with less mistake and expected results by utilizing an incredible structure like FaceNet with 96.92% exactness [14].

Table 1: A comparative study of various algorithms of Deep Learning in literature review

YEAR	AUTHOR	PAPER NUMBER	REFERENCE	TECHNIQUES USED	ACCURACY
2020	Shailender Kumar, DhruvKathpalia		[1]	1. Convolutional Neural Network	96.15%
2020	Dr ArunaBhat		[2]	1. Convolutional Neural Network	97%
2020	SamridhiDev, Tushar Patnaik		[3]	1. Convolutional Neural Network 2. SVM	99.27%
2019	Shreyak Sawhney		[4]	1. Eigenface values. 2. CNN	93%
2020	Tulabandu, AadithyaKiran		[5]	1. deep neural network [DNN] 2. wavelet change.	97%
2018	Radhika C. Damale and Prof.Bageshree.V. Pathak		[6]	1. CNN 2. PCA	98%
2017	Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic		[7].	1. DNN, CNN 2. SVM 3. OpenFace 4. FaceNet	95.02%

Table 2: A comparative study of various algorithms of Machine Learning in literature review

YEAR	AUTHOR	PAPER NUMBER	REFERENCE	TECHNIQUES USED	ACCURACY
2020	VidyaPatil, Anushka		[8]	1. LDA along with KNN and SVM.	97%
2020	Muthunagai.R, Muruganandhan.D, Rajasekaran.P		[9]	1. Principal Component Analysis, 2. wavelet change, 3. OpenCV	97%
2019	Dr. PALANIVEL.N		[10]	1. K-means Clustering. 2. SVM classifier together with Gabor transform.	93%
2018	Rudy Hartanto		[11]	1. LBPH	94.7%

			2. Haar cascade classifier	
2018	Jules-Raymond Tapamo, Louis Mothwa	[12]	1. Principle Component Analysis (PCA) 2. Linear Discriminant Analysis (LDA) 3. Local Binary Patterns (LBP).	85%
2019	Harish M, Chethan P, Prajna N Holla K, Syed Abdul Azeem, M.G. Veena	[13]	1. Facenet Siamese network. 2. Triplet loss and back-propagation	100%
2019	AZM Ehtesham Chowdhury, Omar Khaium Chowdhury, Md. Assaduzzaman Samrat, Md. Zillur Rahman, and Tanvir Ahmed	[14].	1. FaceNet	96.92%

3. CONCLUSION AND FUTURE WORK

As the purpose of the paper is to check the current research work done on facial recognition attendance management system using machine learning and deep learning techniques. After doing the comparative study between deep learning and machine learning techniques, deep learning has best results than machine learning techniques in terms of accuracy. The CNN technique has the high accuracy. Currently many researchers have implemented the facial recognition attendance management system, but there is also have some disadvantages concerning the accuracy, functionalities, lightning drawback etc. These drawbacks should be solved by the proposed system.

The proposed system will support in many ways:

- Increasing the efficiency of system.
- High security to system.
- Minimizing the time required to mark attendance.

REFERENCES

- [1] Shailender Kumar, Dhruv Kathpalia, Convolutional Neural Network based Automated Attendance System 2020 IEEE
- [2] Dr Aruna Bhat, Deep-learning based group-photo Attendance System using One Shot Learning with the help of Deep Convolutional Neural Network. Proceedings of the International Conference on Electronics and Sustainable Communication Systems (ICESC 2020) IEEE Xplore Part Number: CFP20V66-ART; ISBN: 978-1-7281-4108-4
- [3] Samridhi Dev, Tushar Patnaik, Student Attendance System using Face Recognition. Proceedings of the International Conference on Smart Electronics and Communication (ICOSEC 2020) IEEE Xplore Part Number: CFP20V90-ART; ISBN: 978-1-7281-5461-9
- [4] Shreyak Sawhney¹, Karan Kacker², Samyak Jain³, Shailendra Narayan Singh, Rakesh Garg⁵, "Real-Time Smart Attendance System using Face Recognition Techniques", 2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence), 978-1-5386-5933-5/19/\$31.00 c 2019 IEEE.
- [5] Tulabandu Aadithya Kiran, PCA based Facial Recognition for Attendance System. Proceedings of the International Conference on Smart Electronics and Communication (ICOSEC 2020) IEEE Xplore Part Number: CFP20V90-ART; ISBN: 978-1-7281-5461-9.
- [6] Radhika C. Damale and Prof. Bageshree.V. Pathak, Face Recognition Based Attendance System Using Machine Learning Algorithms. Proceedings of the Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018) IEEE Xplore Compliant Part Number: CFP18K74-ART; ISBN: 978-1-5386-2842-3.
- [7] Marko Arsenovic, Srdjan Sladojevic, Andras Anderla, Darko Stefanovic University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Serbia FaceTime – Deep Learning Based Face Recognition Attendance System. SISY 2017 IEEE 15th International Symposium on Intelligent Systems and Informatics September 14-16, 2017 Subotica, Serbia
- [8] Vidya Patil, Anushka Narayan, Automatic Students Attendance Marking System Using Image Processing and Machine Learning. Proceedings of the International Conference on Smart Electronics and Communication
- [9] Muthunagai.R, Muruganandhan.D, Rajasekaran.P, classroom attendance monitoring system using CCTV, 2020 from IEEE.
- [10] Dr. PALANIVEL. N, ASWINKUMAR. S, BALAJI. J. "Automated Attendance Systems Using Face Recognition by K-Means Algorithms", 2019 IEEE International Conference on System, Computation, Automation and Networking (ICSCAN), 10.1109/ICSCAN.2019.8878790, IEEE, 24 October 2019.
- [11] Rudy Hartanto, Face Recognition for Attendance System Detection. Proceedings of the Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018) IEEE Xplore Compliant Part Number: CFP18K74-ART; ISBN:978-1-5386-2842-3.
- [12] Jules-Raymond Tapamo, Louis Mothwa, Conceptual Model of the Smart Attendance Monitoring System Using Computer Vision. 2018 14th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS).(ICOSEC 2020) IEEE Xplore Part Number: CFP20V90-ART; ISBN: 978-1-7281-5461-9.
- [13] Harikrishnan J, Arya Sudarsan, Aravind Sadashiv, Remya Ajai A S, "Vision-Face Recognition Attendance Monitoring System for Surveillance using Deep Learning Technology and Computer Vision", 2019 International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN), 978-1-5386-9353-7/19/\$31.00 ©2019 IEEE.
- [14] AZM Ehtesham Chowdhury¹, Omar Khaium Chowdhury¹, Md. Assaduzzaman Samrat¹, Md. Zillur Rahman¹, and Tanvir Ahmed¹ Department of Computer Science and Engineering, American International University Bangladesh HFDCM: A low-cost machine learning based class attendance monitoring system. 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICT)
- [15] E. Varadharajan, R. Dharani, S. Jeevitha, B. Kavinmathi, S. Hemalatha, "AUTOMATIC ATTENDANCE MANAGEMENT SYSTEM USING FACE DETECTION", 2016 Online International Conference on Green Engineering and Technologies (IC-GET), 978-1-5090-4556-3/16/\$31.00 ©2016 IEEE.
- [16] Omar Abdul Rhman Salim, Rashidah Funke Olanrewaju, Wasiu Adebayo Balogun, "Class Attendance Management System Using Face Recognition", 2018 7th International Conference on Computer and Communication Engineering (ICCCE), 978-1-5386-6992-1/18/\$31.00 ©2018 IEEE.
- [17] Zhen Yang, Wenshan Xu, Zhipeng Wang, Xiuying He, Fan Yang, Zhijian Yin, "Combining Yolov3-tiny Model with Drop block for Tiny-face Detection", 2019 IEEE 19th International Conference on Communication Technology, 978-1-7281-0535-2/19/\$31.00 ©2019 IEEE.