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Face Recognition Attendance System

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ABSTRACT –

There is no reason why an important event in the educational sector like attendance should be handled in the old, boring, traditional fashion in the era of innovative technology evolving at a rapid rate. Both students and teachers will benefit greatly from the time and effort savings provided by the attendance monitoring system. The face recognition algorithm will keep track of attendance by separating only the faces of the students from the rest of the items and then marking them as present. The algorithm will identify individuals who are present and match their traits with the already saved photographs of them present in the database with the use of this pre-fed data because the system will be pre-fed with images of all the students. To accomplish the primary objective of keeping track of attendance, the facial recognition algorithm will differentiate the students' faces from the other items before marking them as present. All of the students' images will be pre-fed into the system, and using this pre-feed information, the algorithm will identify any students who are there and compare their features to previously saved pictures of them that are stored in the database.

Keywords— Face Recognition; Attendance Marking; Hardware unit; Student Management; PC applications; Security and Authentication System.

1. Introduction

The facial recognition algorithm will track the primary goals of attendance by isolating the faces of the students from the other items and then marking them as present. In this manner, the instructor of the class will have their attendance recorded without having to spend time performing traditional attendance marking. Many educational institutions use a manual monitoring system these days, and the majority of the time they unintentionally lose their attendance sheet, making it impossible to accurately track the attendance of their students. Thus, it is crucial to create software that would enable these institutions to track student attendance by facial recognition, saving them time.

2. Literature Survey

Automated Attendance Management System Based On Face Recognition Algorithms [1] In this paper they propose an automated attendance management system. This system is basically based on face detection and recognition algorithms, automatically detect the student when he enters the classroom and marks the attendance by recognizing him. Because of LBPH outperforms other algorithms with better recognition rate and low false positive rate the system is based on this algorithm. The system uses SVM and Bayesian as a classifier because they are better when compared to distance classifiers. The workflow of the system architecture is when a person enters the classroom his image is captured by the camera at the entrance. A face region is then extracted and pre-processed for further processing. As not more than two persons can enter the classroom at a time face detection algorithm has less work. The future work they are saying on this paper is to improve the recognition rate of algorithms when there are unconscious changes in a person like tonsuring head, using a scarf, facial hair. The limitation of the system is it only recognizes face up to 30 degrees angle variations which have to be improved further. Gait recognition should be combined with face recognition systems in order to achieve better performance of the system.

An Evaluation of Face Recognition Algorithms and Accuracy based on Video in Unconstrained Factors [2] There are three well-known algorithms that this paper will compare Eigen faces, Fisher faces, and LBPH by using a database that contains a face of persons with a variety of position and expression. According to the experiment results, LBPH got the highest accuracy on the possible external factors like light exposure, noise, and the video resolution. However, this algorithm has limitation due to the negative light exposure and high noise level more than the other statistical methods. The recognition accuracy also tested with three various video resolutions that are 720p, 480p, and 360p. The results show LBPH got the highest accuracy in 720p while the others got the highest accuracy in 360p video resolution. LBPH can give reliable recognition accuracy hence it uses a histogram similarity, but it was sensitive in some cases.

Class Room Attendance System Using Facial Recognition System [3] This paper aims to introduce a new approach to identify a student using a face recognition system in the classroom environment, i.e. the generation of a 3D Facial Model. This research is to attempt to provide an automated attendance

system that recognizes students using face recognition technology from an image/video stream to record their attendance in lectures or sections and evaluating their performance accordingly.

Real-Time Face Recognition For Attendance Monitoring System [4] On This paper they presented an automated attendance monitoring system with face recognition in a real-time background world for with a database of student's information by using Personal Component Analysis (PCA) algorithm. This task is very difficult as the real-time background subtraction in an image is still a challenge. And, managing a database with multiple of student information's is also a challenge to the system. Implementing of this system basically involving three main phases, which include face region detection, template extraction, and face recognition. Before the feature extraction process, all input images are extracted and converted from RGB into gray scale images. Then, the system starts the histogram equalization in order to enhance the image and the picture is resized so that all images will have the same size. One of the functionality of the system is it will send an SMS to particular parents when the attendance rate of students is below the enforced rate. Euclidian distance is used to calculate the distance between the two images during the matching process when the extracted image is compared with the image in the template database. Then the system shows a result either accepted or rejected based on the threshold.

Automatic Attendance System Using Face Recognition [5] In this system they have implemented an attendance system by which lecturers or teaching assistants can record student's attendance. In this paper, they use Viola-Jones algorithm and PCA algorithm for face detection and face recognition respectively. The system capture images twice the first one is at the beginning of the class and the second one is at the end. Both of the images are important to identify and recognize a student. Finally, the student is marked present only if he/she is recognized in both the images. A sequence diagram for the working process is as follows.

3. Scope of the Project

Face recognition uses a person's facial profile to identify or verify that person's identity. In order to compete with the information in the already existing face collection, this system employs approaches to identify specific discrete information about an entity's face, such as the distance between the chin and nose. A facial recognition system, which typically collaborates with authorised user ID verification services, is able to compare a face from a virtual profile or a video frame with a group of faces. Due to their relevance and lack of interference, these systems strengthen the most effective attested component. Comparing face traits from previously captured photographs is how a facial recognition system operates. One such use for facial recognition could be identifying the presence of various students or staff members in various colleges or businesses for the purpose of attendance. The genuine acceptance rate of a monitoring system must be exceedingly high, while the fake acceptance rate must be extremely low. For an institute to be productive and efficient, the full track record must be managed and evaluated. By reducing human involvement, the automated attendance tracking system completes the routine process of recording attendance. Pose, scale, variations, rotation, illuminations, and occlusions are some of the common concerns that are resolved by the common methods and modes for identifying and recognising face failure. The goal of the provided model is to overcome the shortcomings of the existing models and assign characteristics such face detection, feature extraction, feature extraction detection, and recording analysis for students or employees. For identifying a face's features, the system incorporates many techniques such as integral pictures, image contrasts, colour features, and cascade classifiers. Due to the application of the vast aspects of the face, the system offers increased precision. The system is tested in a variety of lighting scenarios, with various countenances, partial faces present, and with and without beards and eyeglasses.

4. Existing System

The faculty now marks student attendance by sending out attendance sheets or calling students, which occasionally interferes with classroom decorum. This sheet is then given to the admin department, where it is updated on an Excel sheet. This procedure takes a long time and is rather hectic. The biometric technology only works with one professor or employee at a time for institutions or organisations. Why not switch to a face-recognition based automated attendance system instead? It will indicate the presence of students, professors, staff, etc. in a classroom or at the entrance gates.

4.1. Drawbacks of Existing System

A Although humans are fallible, manual time and attendance systems only depend on highly experienced individuals. While using manual processes, management is constantly under pressure to make sure that all of the work-related facts are accurate. It's simple to accidentally switch information, leading to inaccurate data entry or handwritten briefings. This error may lead to inaccurate data as well as issues with the payroll system. Data reporting and verification can take a lot of time and money. Employers in the United Arab Emirates are required to use performance management software to monitor both employee work and non-work hours. Corrections are required in the wake of these accidental errors. A manual transaction must often be created from scratch a new. In these manual or partially automated systems, information must frequently be recorded in writing or entered more than once. Those in the UAE who use HR and payroll software manage all of this enormous muddle and error.

5. Proposed Method

Mechanism for Managing Attendance In order to track everyday student attendance at schools, universities, and institutes, a method called face recognition has been developed. Facial recognition technology may be on the rise and employed in practically every industry, including automation, security, and research. We aim and target the scholars' attendance using Open CV and a few built-in Python features. More physical and mental work is

required to keep track of paper documents, locate data, and maintain accuracy. Following these inadvertent mistakes, corrections are needed. It is usually necessary to entirely rebuild a manual transaction rather than just amend it. Information is frequently written down or entered more than once in these manual or somewhat automated systems. All of this enormous confusion and blunders are handled by people in the UAE who handle HR and payroll software. The student's attendance will be noted if there is a match. At the conclusion of each session, a list of absentees will be mailed to the academic member in charge of the session.

5.1. Modules and Project Description

Student Details Module: Create student details and information of trained faces and delete and update features for new student details.

Train Faces Module: In this module it will train faces and detect them and store in the database it take all samples of faces.

Attendance Module: The detected faces will recognize according to the given data weather the particular person is present or not and marks the attendance according to the data.

5.2. Methodology

Many educational institutions today employ a manual monitoring system, and the majority of the time they unintentionally lose their attendance sheet, making it impossible for them to effectively keep track of their students' attendance. Therefore, it is crucial to create software that will enable these institutions to track student attendance through face recognition, saving them time.

6. Implementation Work

The basis for Haar classifier object detection is Haar-like characteristics. These characteristics make use of the variance in contrast values between adjacent rectangular groupings of pixels rather than pixel intensity values. The contrast variances between pixel groups are utilised to calculate the distance between relative light and dark areas. Two or three neighbouring groups with a relatively significant contrast variance combine to generate a Haar-like feature. Figure 1 illustrates the usage of Haar-like characteristics for picture detection. Changing the size of the pixel group under consideration is all it takes to scale Haar features. This makes it possible for features to find things of various sizes.

Only the sub-images with the highest probability are inspected for all the Haar features that identify an item since the classifiers are cascaded. Moreover, a classifier's accuracy can be modified. One can raise the false alert rate and the positive hit rate by lowering the number of phases. The opposite is also true. With just 100 straightforward features, Viola and Jones were able to identify a human face with 90% accuracy. To detect human facial features such as the mouth, eyes, and nose, Haar classifier cascades must first be trained. To train the classifiers, this gentle AdaBoost algorithm and Haar feature algorithms must be used. Thankfully, Intel developed the Open Computer Vision Library (OpenCV), an open-source toolkit aimed at making computer vision-related programmes easier to deploy. Because it comprises the implementation of Haar classifier detection and training, the OpenCV library is intended to be used in conjunction with applications that belong to the disciplines of HCI, robotics, biometrics, image processing, and other areas where visualisation is significant. Hence, the system will identify the person's face in the video with the aid of this algorithm. The face of the person is marked with a green square as a consequence of the detecting procedure. When a face is found, the user can pause the video and enter the person's information, including name, address, occupation, and criminal history, if any. The detected person might be treated as a suspect if they have a criminal history. The user can select a checkbox in the system to indicate whether or not the person is a suspect. This is how the first module works, which browses a sample movie and finds a face. Local Binary Pattern Histogram, or LBPH A local binary pattern (LBP), which labels pixels in an image by thresholding the pixels' surroundings and translating the result into a binary number, is a straightforward but incredibly effective texture operator. The initial computational phase of the LBPH is to create an intermediate image that, by emphasising the face features of the original image, more accurately describes it. This is accomplished through the algorithm's use of the sliding window concept, which is based on the radius and neighbours parameters. Thankfully, Intel developed the Open Computer Vision Library, an open source toolkit intended to make computer vision-related programmes simpler to deploy (OpenCV). The OpenCV library is designed to be used in conjunction with applications in the disciplines of HCI, robotics, biometrics, image processing, and other areas where visualisation is crucial. It includes a Haar classifier detection and training implementation. Hence, the algorithm will be used by the system to identify the person's face in the video. The face of the person is marked with a green square as a consequence of the detecting procedure. When a face is identified, the user has the option to pause the video and enter details about the identified person, including name, address, occupation, and age. Fortunately, Intel developed the Open Computer Vision Library, an open source library aimed at making computer vision-related programmes easier to implement (OpenCV). When a face is detected, the user can pause the video and enter the detected person's information, such as name, address, profession, and age

The Local Binary Pattern Histogram (LBPH) is a texture operator that labels an image's pixels by thresholding each pixel's neighbourhood and treating the result as a binary number. Local Binary Pattern (LBP) is a straightforward but incredibly effective texture operator. The initial computational phase of the LBPH is to produce an intermediate image that, by emphasising the face features, more accurately describes the original image. The method does this by utilising a sliding window idea depending on radius and neighbours.

Using the LBP operation: The initial computational stage of the LBPH is to produce an intermediate image that, by emphasising the face features of the original image, more accurately describes the original image. The method does this by utilising a sliding window idea depending on radius and neighbours.

7. Result Analysis

The administration of college students needs to be improved because managing students' college attendance has emerged as one of the most contentious topics in society. Although many college students still utilise paper signatures or teacher instructions for daily attendance, emerging approaches point out that as technology slowly advances, certain colleges and universities will eventually switch to punch cards, fingerprints, and smart attendance methods. Although there are several methods to increase attendance, the results are not very strong. Attendance and these strategies share a flaw: fraud will happen, raising the absenteeism rate. This recurring event not only has an adverse effect on students' psychology and physiology but also upholds the regular flow of university instruction and reduces the effectiveness of instruction.

8. Conclusion

The machine learning-based attendance management system achieves the goals of the system for which it was designed. All errors have been fixed, and the system has stabilised. The system is functioning at its best. The problem is fixed by the system. It was designed with the intention of serving as a requirements specification. The system can recognise and identify the face with 85% accuracy at a distance of 40 cm from the camera and in good illumination.

References:

[1] Solanki, K., Pittalia, P. "Review of face recognition techniques", International Journal of Computer and applications., vol. 133, no. 12, pp. 20-24, 2016.

[2] Stoll Chloé, Richard, P. G., Roberto, C., Junpeng, L., Dye, M. W. G., & Florent, A. "Face recognition is shaped by the use of sign language", Journal of Deaf Studies & Deaf Education., vol. 23, no. 1, pp. 1-9, 20

[3] Deng, W., Hu,J.,Guo,J."Face recognition via collaborative representation:its discriminant nature and superposed representation", IEEE Transactions on Pattern Analysis and Machine Intelligence., vol. 40, no. 10, pp. 1-1, 2021.

[4] Pei, T., Zhang, L., Wang, B., Li, F., & Zhang, Z. "Decision pyramid classifier for face recognition under complex variations using single sample per person", Pattern Recognition., vol. 64, no. C, pp. 305-313, 2016.

[5] Shi, H., Wang, X., Yi, D., Lei, Z., Zhu, X., & Li, S. Z. "Cross-modality face recognition via heterogeneous joint bayesian", IEEE Signal Processing Letters., vol. 24, no. 1, pp. 81-85, 2021.

[6] Ding, C., Tao, D. "Trunk-branch ensemble convolutional neural networks for video-based face recognition", IEEE Transactions on Pattern Analysis & Machine Intelligence., vol. PP, no. 99, pp. 1-1, 2020.

[7] Nemirovskiy, V., B., Stoyanov, A. K., Goremykina, D., S. "Face recognition based on the proximity measure clustering", Institute of Cybernetics of Tomsk Polytechnic University., vol. 40, no. 5, pp. 740–745, 2019.

[8] Taniya, K., Nidhi, M., Nandini, T. "Automated human resource and attendance management system based on real time face recognition", IJSRSET., vol. 16, no. 4, pp. 847-853, 2018.

[9] Wu, D., Tang, Y., Q., Lin, G., H., & Hu, H. "Roboust face recognition based on significance local directional pattern and deep learning", Guangdianzi Jiguang/Journal of Optoelectronics Laser., vol. 27, no. 6, pp. 655-661, 2016.

[10] Sun, Y., Zhao, J., Hu, Y. "Supervised sparsity preserving projections for face recognition", Proceedings of Spie., vol. 8009, no. 4, pp. 357-366, 2017.