Facial Recognition-Based Attendance Monitoring System

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Abstract:

The primary objective of this project is to construct a face recognition-based attendance monitoring system for a school to improve and upgrade the existing attendance system, making it more effective and efficient than before. The current outdated system has a lot of ambiguity, which makes attendance taking inaccurate and inefficient. When the authority is unable to enforce the old system's regulations, many issues arise. As a result, this project will use technology to fix the problems with the current system and automate most of the tasks associated with attendance. The face recognition system will be the backbone of the technology. One of a person's natural characteristics that can uniquely identify them is their face. Due to the low likelihood of a face deviating or being duplicated, it is used to trace identity. Face databases will be created for the purpose of feeding data into the recognizer algorithm in this project. After that, during the session for taking attendance, faces will be compared to the database to determine identity. When a person is identified, their attendance will be automatically recorded, storing the necessary data in a database system.

KeyWords: face recognition, attendance and recognizer algorithm.

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I.INTRODUCTION

The most pressing issue with the prior attendance management system was the data's accuracy. This is because a person's attendance may not have been personally recorded by the person who took it, or, to put it another way, it may have been taken by a third party without the institution's knowledge, which would compromise the accuracy of the data. For instance, because student A is too lazy to attend a particular class, student B assisted him or her in signing for attendance, despite the fact that student A did not attend the class. However, the system ignored this issue because there was no enforcement in place. If the institution decides to implement enforcement, it might have to waste a lot of time and human resources, which would be counterproductive. As a result, the previous system's entire attendance record is unreliable for analysis.

II. PROBLEM STATEMENT

Assuming that it takes a student approximately one minute to sign his or her attendance on a three-to-four-page name list. Clearly inefficient and time-consuming, only 60 students can sign their attendance in one hour. The third issue concerns the legitimate party's ability to access those details. For instance, the majority of parents are extremely concerned about keeping track of their children's actual whereabouts to ensure that they actually attend school or college classes. However, the parents cannot access such

information in the previous system. As a result, changes need to be made to the previous system in order to make it more effective, ensure the accuracy of the data, and make the information accessible to those who are legitimate.

III. PROJECT SCOPE AND DIRECTION

All students and faculty of an educational establishment are the focus of the attendance monitoring system. The attendance management system's database can hold up to 2000 individual records. The facial recognition procedure can only be performed on a single individual at a time. After the login process, admins and non-admins will have access to two distinct webpage interfaces. Because the attendance system's database needs to be continuously updated, the project must be carried out in an area with Wi-Fi coverage. In order to make the smart device more portable, a power bank powers it.

1.1IMPACT, SIGNIFICANCE AND CONTRIBUTIONS.

Today's attendance management systems are often inefficient and do not share information. As a result, these limitations will be overcome and further improved in this project. The following are the project's effects and contributions:

Students will be more likely to show up to classes on time. This is because a student's attendance can only be taken personally, and the system will notice any absentees. This can not only teach the student to be on time but also prevent them from violating morality by signing their friends' attendance sheets. The institution can save a lot of money because enforcement is now handled by technology rather than through human supervision, which would waste a lot of people's time on a small task. The attendance system is portable, allowing it to be placed in any intended location as long as there is Wi-Fi coverage. The smart device can operate in any location as long as there is Wi-Fi coverage. To take attendance, for instance, the device can be positioned at the classroom's entrance.

- ✓ It saves a lot of money because there is no longer any need for paperwork.
- ✓ Because every calculation is done automatically, the system also saves time.
- ✓ In a nutshell, the objective of the project is to address the shortcomings of the previous attendance system.

V. RELATED WORK

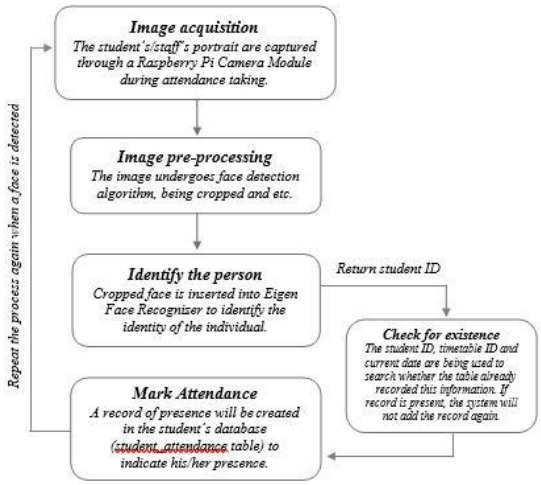
There are a few issues that impede the project's development in a minor way during its development. At first, a graphical user interface (GUI) is created to make it easier for the user to store their portrait for the face database. To help with the creation of the graphical user interface (GUI), an external library known as guizer is downloaded. Be that as it may, there are numerous restrictions to this library as it doesn't uphold the perspective on other picture document type with the exception of .gif picture record type. As a result, the window cannot display images. In addition, the GUI window's layout is constrained in a number of ways, making the design undesirable. As a result, later on, guizer is no longer used, and Tkinter takes its place.

Aside from that, there aren't enough faces in the created database to test the recognizer because only a small number of volunteers are willing to help build the database. However, this issue can be resolved by conducting some online research, which led to the discovery of the solution of using a face database that has already been prepared and can be downloaded from the internet. The normalized and grey scale face database that was downloaded makes the testing process very easy. The developed website, on the other hand, can only be accessed locally by Raspberry Pi-connected devices in this project. This is because the institution does not have the authority to change the networking system. However, if the authority permits the implementation of the port forwarding configuration, the raspberry pi can gain access from an external network.

Additionally, dealing with the captured image's pre-processing is extremely challenging. Fortunately, those issues can be fixed by looking for suggested solutions on the internet. In a nutshell, incorporating the majority of the complex algorithms found in the library itself—which only need to be comprehended in order to be able to incorporate them into the system that is currently in the process of being developed—can make the process of developing a face recognition system much simpler if sufficient background knowledge of the processes involved is present. A web cam is used to take pictures of students. With a variety of gestures and

perspectives, multiple images of a single student will be taken. These pictures are processed first. The Region of Interest (ROI) that will be used in the recognition process is created by cropping the images. Resizing the cropped images to a specific pixel position is the next step. After that, these pictures will be changed from RGB to Gray scale. After that, these pictures will be saved in a folder with the names of each student. A webserver can be used to complete the face database creation and the remaining steps. As a result, a web server will also be used to collect attendance.

VI. SYSTEM ARCHITECTURE



VII METHODOLOGY

Here, OpenCV and a Haar-Cascade Classifier are used to detect faces. Before it can be utilized for face detection, the Haar Cascade algorithm must be trained to recognize human faces. The term for this is "feature extraction." There are 40 distinct subjects in the provided database, each with ten sets of their very own portraits taken on a different timeline. Subjects with various expressions, such as smiling, frowning, and so on, are included in this database. Aside from that, a portion of the subjects have different minor departure from their face like wearing glasses in a portion of their pictures. Preparation of training data, training of the face recognizer, and prediction complete the face recognition process. The images in the dataset will serve as the training data in this case. They will be doled out with a number name of the understudy it has a place with. Face recognition is then performed on these images. The system's face recognizer is the Local Binary Pattern Histogram. First, the entire face's list of local binary patterns (LBP) is compiled. The students and faculty of an educational establishment are the targeted groups of the attendance monitoring system. The data set of the participation the executives framework can hold up to 2000 person's data. One person at a time can only be used for the facial recognition process. After the login process, admins and non-admins will receive two distinct webpage interfaces. After all of the configurations have been completed, the website can now be used. Users like the lecturer can start recording attendance by simply going to the Attendance Management System website's "Record Attendance" tab. However, the user must be granted access to this tab by logging into the system with the "contributor" role (as will be discussed in greater detail in Chapter 5). The user will be prompted to select the current timetable ID from a table and the date to begin the attendance process after logging into the appropriate tab. A PHP file called student_attendance.php will be called when the user clicks the "submit" button. From that file, a Python script called record_attendance.py will be run. When the Python script is called from this student_attendance.php file, two variables—the timetable ID and the current date—will be passed to it from the html via the POST method. We can create applications for real-time computer vision with the help of OpenCV, a library that runs on all platforms. It primarily focuses on image processing, video capture, and analysis, including face and object detection capabilities. The fundamental data structures of scalar, point, range, and others are covered in this module. that are utilized in the creation of OpenCV applications. It also includes the multidimensional array Mat, which is used to store images, in addition to these. Robotics, medicine, industrial automation, security, and transportation all make use of OpenCV. OpenCV can be utilized in robotics to locate a robot. It can also be used in human-robot interaction, obstacle avoidance, and navigation.

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OpenCV can aid patients in medicine by classifying and identifying cells or tumors, segmenting in two dimensions and three dimensions, reconstructing organs in three dimensions, and performing vision-guided robotic surgeries. When it comes to stock defects, barcodes and packages, object sorting, document analysis, and many other tasks, industrial automation can be helpful. This can be used in surveillance and biometrics for security, and it can also help us develop autonomous vehicles and detect driver vigilance for transportation.

VIII CONCLUSION

The old method of taking attendance has many flaws, causing a lot of problems for the majority of institutions. As a result, the attendance monitoring system's facial recognition feature can not only ensure that attendance is taken accurately but also eliminate the shortcomings of the previous system. By delegating all of the complicated tasks to machines, using technology to fix defects can not only save resources but also reduce the amount of human involvement in the process. The only cost of this solution is having enough storage space for all the faces in the database. Fortunately, there are micro-SD cards that can accommodate the volume of data. The face database is constructed successfully in this project. In addition, the face recognition system is performing satisfactorily. A webpage is also successfully constructed with user-friendly, fully functional features. The built database is hidden from the user, but they can still access it and make changes to it through the excellently designed webpage.

REFERENCES

[1] [1] Li Cuimei, Qi Zhiliang, Jia Nan, Wu Jianhua, "Human face detection algorithm via Haar classifier combined with three additional classifiers",13th IEEE International Conference on Electronics Measurement & Instruments (ICEMI),2017.

[2] Qingdong Liang, Wenting Fang, "College Student Attendance System based on Face Recognition", IOP Conf. Ser.: Mater. Sci Eng. 466 012107, 2018

[3] Kritika Shrivastava, Shweta Manda, Prof. P.S. Chavan, Prof. T.B. Patil, "Conceptual model for proficient automated Attendance System based on Face Recognition and Gender classification using Haar Cascade, LBPH algorithm along with LDA model", International Journal of Applied Engineering Research , Volume 13, 2018

[4] Xiaoyang Tan, Bill Triggs, "Enhanced LocalTexture Feature Sets for Face Recognition under Difficult lighting conditions", IEEE Transactions on Image Processing, 2010

[5] Deepan.P1, Raja Vignesh.R2, Venkateswaran.S3, "Face Recognition based Automated Attendence Management System using Hybrid Classifier", International Research Jouranal of Engineering and Technology (IRJET) e-ISSN: 2395-0056, vol.4 Issue: 5, p-ISSN: 2395-0072, May 2017

[6] Subarna, B. Viswanathan, " Real time Facial expression recognition based on deep convolutional spatial neural networks", D.M. International Conference on Emerging Trends and Innovations in Engineering and Technological Research, 2018

[7] Felix Juefei-Xu, Marios Savvidas, "Subspace-ssssssssssssssssBased Discrete Transform Encoded Local Binary Patterns Representation for Robust Periocular Matching on NIST's Face Recognition Grand Challenge", IEEE Transactions on Image Processing, Vol. 23, No.8, 8,August 2014

[8] Visar Shu, Agni Dika, "Using Real time Computer Vision algorithms in Automatic Attendance Management System", 32nd Intenational Conference on Information Technology Interfaces (IEEE ITI -2010)

[9] Naved Khan Baloch, M Haroon Yousaf, Waqar Ahmad, "Algorithm for Efiicient Attendance Management: Face Recognition based approach", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012

[10] Timo Ahonen, Abdenour Hadid, Matti Pietika Inen, "Face description with local binary patterns: Application to Face Recognition", IEEE transactions on pattern analysis and Machine Intelligence, Vol. 28, No:12, Dec 2006