ARTIFICIAL INTELLIGENCE DESIGNED FOR ATTENDANCE

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ABSTRACT

Engaging online students is a challenge for many teachers. While I was a student, I saw teachers struggling to take attendance due to the number of students leaving their classes after attendance. Students would be held responsible for their work using facial recognition technology. To simplify the process of applying absences to students in each class, this paper proposes an application that would allow teachers to stay on top of their work. We applied our software to test "students" in the classroom and used various libraries/CSC styles to create a classroom that is easy for both the student and the teacher to read. Our designs are built upon OpenCV and PIL which are used as geometric classifiers to determine if the student is present. We tested several faces to see if the algorithm was suitable for the program. After conducting a qualitative evaluation of the approach, we've begun to implement registration, create new classrooms with different databases, and apply verification. With the addition of HTML code, we wereable to create a classroom that is safe, engaging, and easy to use.

KEYWORDS

Machine Learning, Artificial Intelligence, Python, JavaScript.

1. INTRODUCTION

As a student, I had a difficult time attending classes during quarantine. Ever since covid cases have risen, I realized the difficulty of managing the classrooms as I watched my teachers take ten minutes trying to take attendance. Covid precautions added more stress to teachers which severely affected the relationships between a student and their teachers by focusing on adjustment rather than focusing on the students themselves. It's not like traditional campus-based classes which require students to have a strong ability to create and stick to a schedule. Between class times, club meetings, homework, and jobs or work-study; online classes can be viewed as redundant and a hassle. Using our program would entice students to prepare for classes while also keeping them accountable for their schedules. This allows people and instructors to easily manage classrooms, meetings, and the number of people who attended the class. However, some consequence of this app is the flexibility. Ai- Attendance is fairly new and only has the basic foundations of the app which mainly concerns the website and its functionality. We are planning to develop feedback into the program so educators or mentors can have a mailbox dedicated to engagement in the classroom. It's a new look for educators and digital learners and it allows teachers to have more efficiency in classroom management.

a. What are existing related methods/tools on this topic?

To correlate the faces to the students in the database we use a library called OpenCV. OpenCV is a library used for image processing and plays a large role in programs with machine learning

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algorithms. Companies like Google, Yahoo, and Microsoft use OpenCV to create amazing applications. However, performing face detections with Cascade Classifiers could not reliably detect humans in certain images. We've tested several different images to find that in some of them they would detect random spots in the corners with no faces at all. When tested with the video we found that the program was not compatible with moving pictures. We resolved to call a PIL module that stores pictures of individuals that would allow the computer to train and recognize the faces through a function called finding_closest_match. Here, teachers can use screenshots of the classroom to determine who is present in the classroom. This function uses a folder of people's pictures and then maps the image for similar geometric details from the database. In this paper, we follow the same line of research by Google Classroom. Our goal is to create a classroom that allows teachers to manage students entirely. Our method is inspired by Google Classroom's database; their learning platform is what inspires us to make an app that would allow teachers to navigate who is attending or leaving the classroom. There are some good features of our app. We have two roles within our app, the administrator and the student. The teacher position contains special admin roles and is able to create classrooms and send invitations to the students to join theirs. The process is similar to Google Classrooms except the teachers are able to create passwords for each classroom. While in the homepage, teachers have the ability to create new classrooms and add in new students. Students are able to access the classroom once given the passcode for the classroom. From then, teachers are able to see when the student enters the classroom. Our app also ensures that no stranger comes into the classroom with our verification app. To prevent the possibility of people trying to gain access to an online account that isn't theirs, we use two authentication factors to protect the user's credentials. Teachers and students will be able to log in by using a TOTP app that gives them the code.

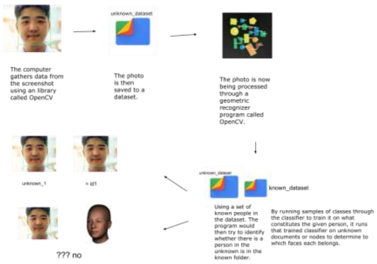
Before creating Ai-Attendance, I took some courses in Java and HTML to understand the basics of web design. I've been inspired by the decorated websites and the ease of access that they contained. Searching through several different templates for HTML and CSS websites, we decided to settle on a template that was user-friendly. I tested several different students inside the classroom to see whether the program can recognize the students. Using a process-based evaluation, we checked to see whether each function in the website would work as intended and look aesthetically pleasing. We found a couple of kinks concerning the app route but were able to implement a solution each time. For the testing of the student's faces, we used a variety of faces to find the closest match in the classroom. Some libraries were unable to work as it was incompatible with some photos that used jpeg formats. Instead of using OpenCv, we translated from CV2 to PIL. From PIL we are able to use images from Google Drive to then match the individual's face to the ones in the drive. We also tested the different types of forms on the website by modifying the address bar. We tried to ensure that no one would be able to access the accounts through the website by changing the address or being able to inspect the password.

CHALLENGES

Actively reading the face from multiple different angles proved to be a challengebecause of the measurements in the facial recognition functions. Due to the inability ofthe program to recognize faces in live video, the program would often result in errors.

METHODOLOGY/SOLUTION

Ai-Attendance relies on facial recognition to identify students. First, we create two folders to help us distinguish the faces of the students. Our certificated classroom is created using a firebase folder linked to the firebase server. There would be a server that holds all of the student information, teacher information, class information, and second verification information. The student should be provided with a name, id number, picture, and a verification code. A fiducial point recognizer program called OpenCVwould then be used to process the system. We imported cv2_imshow from OpenCV and imported ImageDraw for mapping out the face encodings since we were using Google's web IDE. By breaking down the image, they train the computer's deep neural network to better understand the dataset so it can recognize the student once they log on. Our program would run the function facial_recognition from the firebase console so it would only find the location of the known faces. It associates facial encoding with their identification by comparing the folders and known persons. The tolerance determines the distance between faces to consider the faces a match and returns a true or false if the tolerance is lower. In the event that they recognize the face as belonging to the student, the computer records its attendance. An overview of the process is shown in Figure 1.



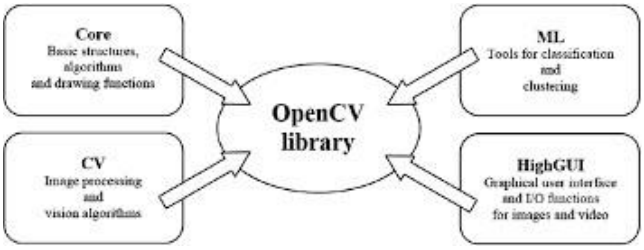
The computer gathers data from the screenshot using an library called OpenCV

The photo is then saved to a dataset.

The photo is now being processed through a geometric recognizer program called OpenCV.

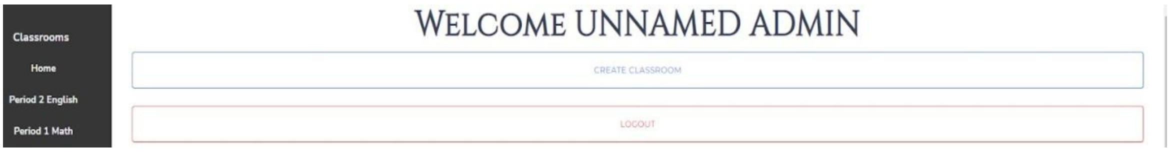
Using a set of known people in the dataset. The program would then try to identify whether there is a person in the unknown is in the known folder.

By running samples of classes through the classifier to train it on what constitutes the given person, it runs that trained classifier on unknown documents or nodes to determine to which faces each belongs.

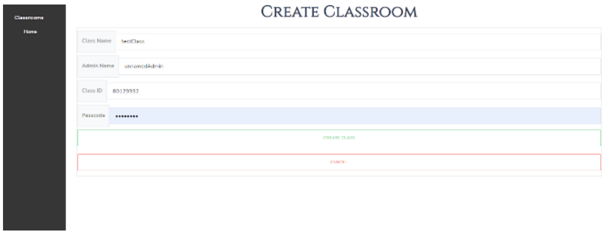

Core
Basic structures, algorithms and drawing functions
ML
Tools for classification and clustering
OpenCV library
CV
Image processing and vision algorithms
HighGUI
Graphical user interface and I/O functions for images and video

DESIGN EXPERIMENT RESULTS

1. The reason we created Ai-Attendance was mainly for the convenience of the teachers during the lockdown and to expand my knowledge of machine learning and web development. I conducted research with my professor on how OpenCV works. Several tests were made on the project to ensure that facial recognition would work. Matching celebrities' faces with various photos were one of the experiments we practiced. We however were unable to create a live video as the database only took photos. My hope is that I will be able to further develop this project in the future. Our website tested the teacher's abilities as well as the students' perspectives.



WELCOME UNNAMED ADMIN



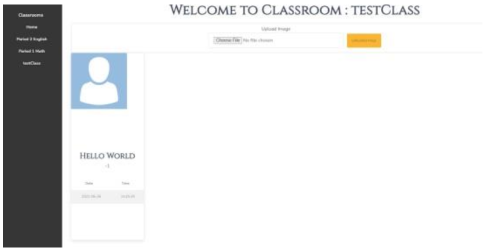
CREATE CLASSROOM

Class Name testClass

Admin Name unnamedAdmin

Class ID 80129932

Passcode ••••••••



WELCOME TO CLASSROOM : TESTCLASS

HELLO WORLD

How does your solution solve the problems?

My solution solves the problem of addressing classroom management by allowing teachers to upload a picture of the classroom to determine who is currently inside the classroom. We sampled different accounts to check whether the students have been recognized in the program and whether they have difficulty logging into a newclassroom. The results show that students were able to access and be added to theclassroom. Based on the feedback I received, the classroom should have limits on the student's facial tests, which I agree with and hope to address later.

RELATEDWORK

1. Kaur, Paramjit, et’s "Facial-recognition algorithms: A literature review." describe a method that discusses the broad range of methods used for face recognition and attempts to discuss their advantages and disadvantages. Initially, we present the basics of face-recognition technology, its standard workflow, background and problems, and the potential applications. Their job is very useful.
2. In Richards, Gregor, et al. "An analysis of the dynamic behavior of JavaScript programs." Proceedings of the 31st ACM SIGPLAN Conference on Programming Language Design and Implementation. They perform an empirical study of the dynamic behavior of a corpus of widely-used JavaScript programsand analyze how and why the dynamic features are used. We report on the degree ofdynamism that is exhibited by these JavaScript programs andcompares that with assumptions commonly made in the literature and accepted industry benchmark suites.
3. Hashemipour, Sadegh, and Maaruf Ali. "Amazon web services (AWS)–an overview of the on-demand cloud computing platform." They discuss how AWS contributes to a range of industries making them dependent on AWS’s agility, scalability, and deliverability of services. Implementation using information available on AWS leading portals as well as the practicalexperiments involving the discussed features are given. As more and more industries become dependent on Big data and AI, one can state that AWS will play a key role in future developments across myriads of industries.

CONCLUSION

As a result of the Pandemic, I was inspired to develop an application assisting teachers with their attendance. It was through this project that I learned how to incorporate machine learning with web development. Platforms like Repl.it, Firebase, and Colab made it possible for me to create an environment for my application. I solved challenges such as implementing facial recognition with my new experience in machine learning using OpenCv, Tensor Flow, and GitHub. After finishing our software for facial recognition, we focused on safety and the ability to create new classrooms in the app.The TOTP generator and secrets allowed us to make a second authentication as well as reset passwords for users. The project turned out to be a success, however, we are still developing the program so we could expand on machine learning and the limits to classroom safety. Previous experiments from the algorithm proved to be effective as it identified the person from 10 tests with up to 15 people in a picture. The effectiveness of the project is mostly limited to the classroom page and the TOTP generator.Currently, we are at a disadvantage in terms of managing our classrooms. I want to be able to create an environment that allows teachers to easily add students. In spite of this, they are only able to add them one at a time, which makes it inconvenient for them. By making the buttons more visible and navigable with CSS and HTML, I will be able to improve accessibility through web routes and page functionality. In the future, I’m going to be improving upon the designs, data management, and sourcing of the project.

REFERENCES

https://codepen.io/pen/

https://www.w3schools.com/w3css/w3css_templates.asphttps://pug2html.com

https://pugjs.org/api/getting-started.htmlhttp://www.html2jade.org/

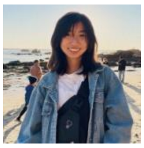
https://www.tutorialspoint.com/html/html_quick_guide.htm

Documentation: https://cirrus-ui.netlify.app/getting-started/developing

Github:https://github.com/Spiderpig86/Cirrus

CDN: https://unpkg.com/cirrus-uihttps://github.com/ageitgey/face_recognition

AUTHORS



Jasmin Grace Liao, I am currently a senior at Trabuco Hills High School! I spend most of my time involved with coding competitions such as Gamegalas and like to involve myself in coding projects in and outside of school!

Dr. Yu Sun Professor at Calpoly