



Automated Face Recognition Attendance System

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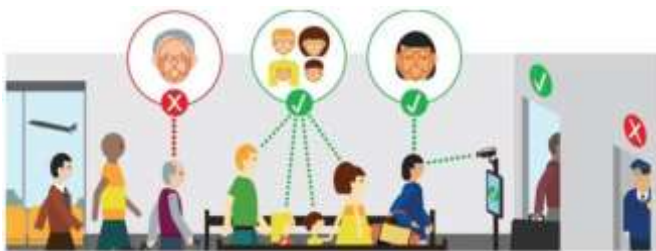
Abstract— With this system what we are trying to propose is a real time face recognition attendance system, it would not only be capable of identifying the faces in an image but will also try to identify a person in the image. the overall objective is to identify the faces in a live stream of a video, i.e. the stream might come from a video recording (CCTV) or it can also identify the faces from a WEBRTC video stream. Today due to covid19 epidemic most of the interactions are being conducted online or via internet. This would also be a contact less authentication system if integrated with the suitable hardware

WEBRTC today is being widely used in Real time communication because of the simplicity and performance. This system would provide interesting dashboard of the analysis done using ELK Stack which would be embedded in this application.

Keywords -Student Management, Image Processing, ELK, k- NN and Convolutional Neural Networks (CNN)

I. INTRODUCTION

The overall intent of this system is to identify the persons in the live stream of video. But to do this the prerequisite is we would at least need one pic of the person which you need to identify Attendance system is just a single use case of this, this could be modified and configured to work for different use cases as well like Find Missing children and disoriented adults, Identify and track criminals or Support and accelerate investigations and many more. What we are considering is the use case in which we can take attendance of the students who are attending classroom, it could be an online class as well from apps like zoom, google hangouts, skype ..etc.



II. PROBLEM STATEMENT

Using paperwork for attendance is quite known in today's colleges and schools. We would like to solve this problem, we do understand that there are different alternatives available like RFID, fingerprint, ISIRIS based authentication. But we are trying to make the overall experience hazel free, quick and even non tech savvy people could

use it elegantly. Also, aggregation of results should be easy, and dashboards should be self-explanatory to derive some important outcome from it. Also, in this COVID19 epidemic situation most of the students would attend the classes via some tools this solution also looks at tapping the WEBRTC video stream and trying to identify the students attending the online class

III. LITERATURE SURVEY

Current alternatives for attendance monitoring.

RFID (Radio Frequency Identification)-based Attendance System

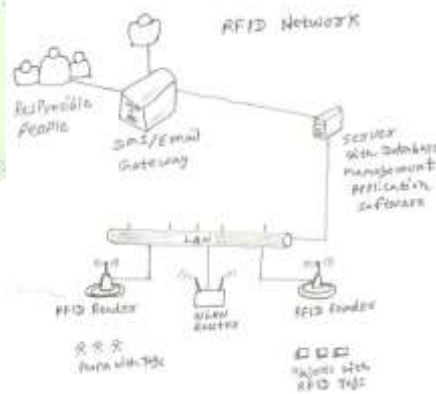


Fig1: RFID Architecture

Advantages of RFID

- Unlike barcodes, tags can store more information. Moreover, it follows instructions/commands of reader.
- RFID tags are used for tracking luggage as well as for monitoring health history of patients in the hospitals.
- Its versatile in nature
- This can be used for security and attendance purpose in offices, schools and colleges
- Can monitor time-in and time-out in database of the server.

Disadvantages of RFID

- Costly
- Can be easily tapped or intercepted.
- Installation is time consuming.
- Electromagnetic interference can limit remote reading.
- It has around 3 meters coverage range

Fingerprint based Attendance System

Meaningful features known as minutia points from the fingerprint are used. Scanner analyze out attributes such as orientation, ridge direction, loops, arches, and whorls in the print.

Disadvantages

- Rate of Error
- Slow
- Infection Carrier could spread disease
- Difficulty in Scanning
- Physical Challenges: if someone has lost his finger he could face difficulty in enrolment process.
- Environmental Challenges: Under extreme environmental conditions accuracy might affect

Iris-Recognition Based Attendance System:

Among the different biometric this is most reliable Iris biometric authentication has complex implementation.

Disadvantages:

- Target or inferencing area is pretty small
- Obscured by eyelashes, lenses, reflections
- Partially occluded by eyelids
- As pupil changes size, results may vary
- Some negative (Orwellian) connotations

Python: learning curve of python is not so steep. As compared to other programming languages. Python is currently being used today in most of machine learning and artificial intelligence project. Python was got a lot of inbuilt libraries, so we don't need to write code from scratch. So, it saves lot of time and you will be able to see results quite early

Face Recognition: is a python library which can be used for face detection and face recognition Built using dlib's state-of-the-art face recognition built with deep learning. The model has got great accuracy on the Labeled Faces in the Wild benchmark

Find all the faces that appear in a picture:

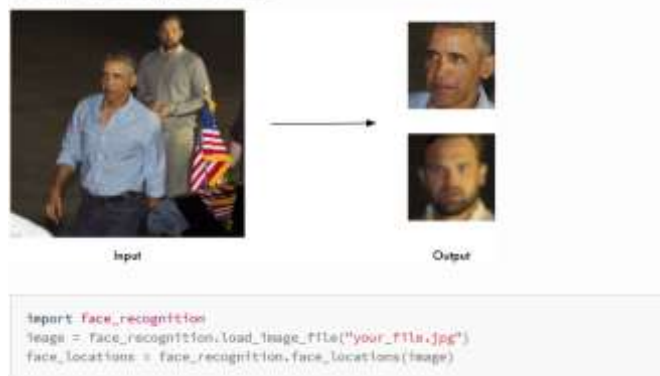


Fig.2 Face recognition

WEBRTC: Web Real-Time Communications (WebRTC) is an open source project created by Google. WEBRTC is used basically for peer to peer communication but due to its ease of implementation and high-performance results most of the apps are incorporating WEBRTC.

KNN: KNN is a model that classifies data points based on the points that are most like it. It uses test data to make an “educated

guess” on what an unclassified point should be classified as. There have been various studies conducted on how this algorithm can be improved. These studies aim to make it so you can weigh categories differently in order to make a more accurate classification. The weighting of these categories varies depending on how the distance is calculated. In conclusion, this is a fundamental machine learning algorithm that is dependable for many reasons like ease of use and quick calculation time. It is a good algorithm to use when beginning to explore the world of machine learning, but it still has room for improvement and modification.

Pros:

- Easy to use.
- Quick calculation time.
- Does not make assumptions about the data.

Cons:

- Accuracy depends on the quality of the data.
- Must find an optimal k value (number of nearest neighbors).
- Poor at classifying data points in a boundary where they can be classified one way or another.

ELK: The ELK stack is an acronym used to describe a collection of three open-source projects – Elasticsearch, Logstash and Kibana. Elasticsearch acts as a storage for logs. We can consider it as a document-based database system, where all the records are stored in the form of documents. Logstash can act as aggregator and can give you better formulated details. Kibana is used to display aggregated results on the dashboard

IV. PROPOSED WORK

As stated, the whole implementation would be done in python, we would be creating a web-based application. Where the end user has repository of images which are clicked while registering the student. We would need a single image to train our classifier. The image quality needs to be good as we would be taking only one image of the student who needs to be identified. We can register new student using this application as well.

We would be using flask webserver to host the application. We would need live feed of a video whose source might be a cctv footage or video stream might come from an application hosting an online video communication platform. We could tap the stream and break it down into frames. From each frame we would work on identifying the person in that image captured from the stream.

As an output either the persons in the image gets identified or gets notified as an unknown person. if the person gets identified the database gets updated marking that person as present. All the data about the current status of the person in the image gets updated in database. This is connected to ELK stack to get better reports and dashboard. We would need to create index in Elasticsearch which would act a schema for our database. All the required data would be stored in the format decided by index. Then the data could be aggregated and queried depending upon our requirement. The output of our query could be presented in the graphical format using Kibana

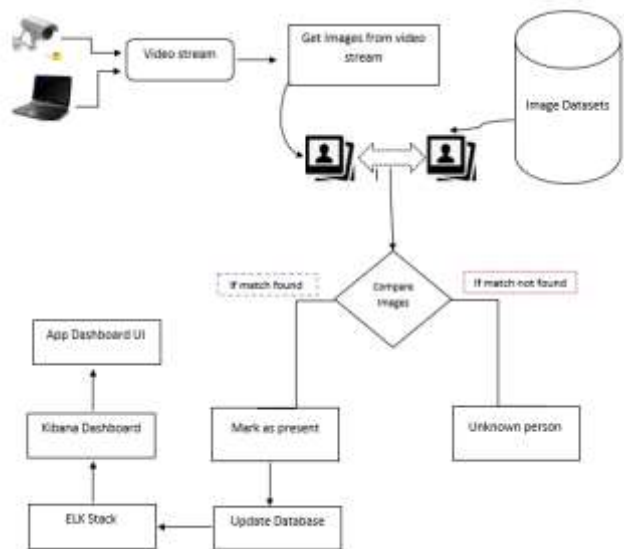


Fig.3 Architecture diagram

V. RESULTS

We would be getting dashboard about the attendance of the students and we can aggregate those to get the monthly average.

STUDENT	PRESENT	ABSENT	LATE	LEAVE	TIME IN	REMARKS
Shruti Kulkarni	✓	○	○	○		
Ushita	○	✗	○	○		
Shruti Desai	○	○	○	○		
Chaitanya	✓	○	○	○		
Ashwini	○	○	○	○	10:58 AM	
Shruti Kulkarni	✓	○	○	○		
Ashwini Chaitanya	○	○	○	○	10:58 AM	
Shruti Kulkarni	✓	○	○	○		
Chaitanya	○	○	○	○		
Shruti Kulkarni	✓	○	○	○		

Fig.4 Student attendance sheet prototype



Fig.5 Aggregated Results Prototype

VI. CONCLUSION

The presented work can be concluded using the following points:

1. This paper helps in knowing the technologies in brief which can be used for face identification and recognition.
2. Paper also includes different techniques used for attendance monitoring system
3. Brief introduction about the architecture and implementation is defined

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