Work Force Management System Using Face Recognition

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***Abstract*—** The primary aim of this research is to build a web application for Work Force management using face-recognition to replace the traditional system being used to take attendance which is not very efficient. The traditional method being used is prone to errors and creates a lot of ambiguity in retrieving the data. With the help of technology, we are going to develop an automated system which can cut the problems in the traditional system.

The technology that works behind is going to be the face recognition system. There is an admin module where the admin can register the individuals into the system. The system captures photos of the workers while registering. The face recognition engine is trained and then attendance can be detected.

The attendance detected can be stored into the database and can be retrieved any point of time using the Django web server. This project can be used to manage the workforce in an easy way.

Keywords - Django, python, Image Processing, Face-Recognition.

I. Introduction

A Workforce management system (WFM) is a pile of operations that an Organization uses to enhance the performance of the workers. WFM deals with successfully predicting the worker requirements, create and organize workers shifts to complete the given task.

A WFM mainly deals with attendance of the workers, basically the attendance systems are of two types:

A. Manual Attendance System

In a manual attendance system, the attendance is taken using the paper and pen-based approach which might result in data loss, proxy, human error, replications…etc. To overcome these issues, we replace the Manual Attendance System with the Automated Attendance system

B. Automated Attendance System

As the name speaks the attendance system will be completely automated. The system will automatically detect using the face recognition technology that we develop and marks the presence of the worker in the database. This data can be retrieved easily at any point of time. The chance of error is very less when compared to the manual attendance system.

We built the WFM system using Django, which is one of the best frameworks of python to build the web applications. Django comes with an inbuilt webserver which makes the work super smooth. We imported the OpenCV library which helps the engine to recognize faces of the workers.

Improved worker productivity, better planning, low operational costs, efficient time, and attendance tracking are the benefits an organization can achieve by using a workforce management system.

II. LITERATURE SURVEY

The attendance plays a significant role in managing the workers. Traditionally the attendance is being taken manually which is very prone to errors and proxy. Not only the errors but also it is difficult to

retrieve the data when needed [1,2]. The old method using paper for attendance can no longer be used and we found out a lot of other methods being used in our research.

According to a research by Bhise, Khichi, Korde & Lokare in 2015 named Attendance System Using NFC Technology with Embedded Camera on Mobile Device the structure was developed utilize Near Field Communication (NFC) and mobile application [3,5]. Each student was issued with an NFC tag which will have an unique id, and to take the attendance the tag must be moved on the lecturer smart phone. The smart phone camera will snap the face of student and verify it with the face of the student in the server [4,7,8]. This process is very fast, but usage of mobiles can create problem if the lecturer forgets bringing his mobile and the privacy of the lecturer can be at risk. So, a better system like bio-metric or face recognition is preferable.

The second research journal by Senthamil Selvi, Chitrakala & Antony Jenitha in 2014 named as "Face Recognition Based Attendance Marking System" works on face recognition to overcome the issues in the previous model. This model uses the camera to take snap of the faces of the workers, then detects & recognizes the faces one by one in the database[9,10]. The advantage of this system is the attendance will be marked on the server which is secure that no one can access and manipulate or tamper the attendance. This system is not very portable it needs a system running all the time which creates a drawback.

The third research journal by Kumar Yadav, Singh, Pujari & Mishra in 2015 named as "Fingerprint Based Attendance System Using Microcontroller and LabVIEW" proposed usage of fingerprint to mark the attendance. This process is achieved by using two microcontrollers. The fingerprint is obtained through a fingerprint sensor, the received knowledge is transmitted through the micro controller 1 to micro controller 2 to check with knowledge in the database. After finding the matching student it displays the message [11,12,13]. This model is super sweet because of its speed but we cannot easily access the data stored in the database.

The fourth research journal by Hussain, Durga, Deka & Hannan in 2014 named as "RFID based Student Attendance System", proposed that RFID technology is used to improve the previous attendance system. In this again a reader and a tag are being used to track the attendance of the individuals [14]. This stands out from the previous journals as it has an online portal for retrieval of data but has drawbacks as the RFID reader works only when connected to a personal computer.

In conclusion, the current attendance monitoring system is not perfect, a better system should be developed for better accuracy and easy tracking of the attendance.

III. THEORETICAL ANALYSIS

We built a Web Application for Workforce Management using Face Recognition to manage the workers of an organization. We developed the application using Python, OpenCV & Django.
We choose Python because.

- it is easy to learn and use,
- it has a mature and supportive python community,
- it has a hundred of python libraries and frameworks.
- it is versatile, efficient, and fast.

OpenCV is specific, speed and efficient which was perfect for the face-recognition engine we built.

For building the web application, we opted for the Django Web framework because it has simple syntax, comes with own web server and essentials needed for solving common cases.

Django is top level python web development framework to create dynamic, stable, maintainable, and secure websites. It gives a hassle-free web development framework. It is a free and open source. It allows to write code, which is complete, versatile, secure, scalable, maintainable, and portable.
The Django framework follows the MVT (Model View Template) software design pattern.

- URLs: It helps to process the requests from every single URL to function.
- Views: It is a function to handle requests, it receives the requests of HTTP and returns responses of HTTP.
- Models: They are objects of python that are used to define app data structure and to perform CURD actions on the database.
- Templates: It defines the layout or structure of the file. Ex: Html

We write functions for the face recognition module in the views. In the URLs the connection of the functions is given. In models we create the structure of the data needed for the employee[15,16] . In the template using the jinja format we convert the html page to dynamic.
The face recognition system works on basis of the inputs given. The worker photos are captured and converted into NumPy arrays to train the engine[17]. The trained engine is used to recognize the workers and mark their attendance in the database.

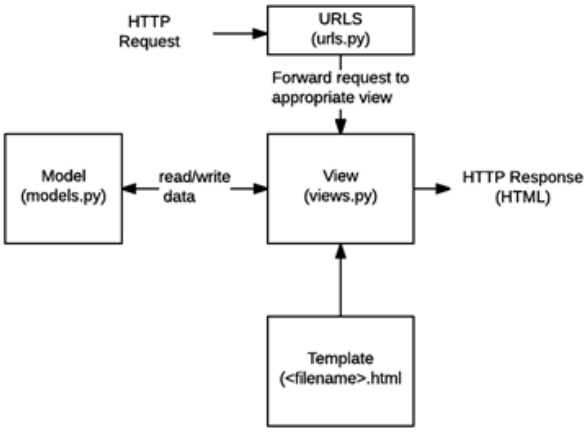


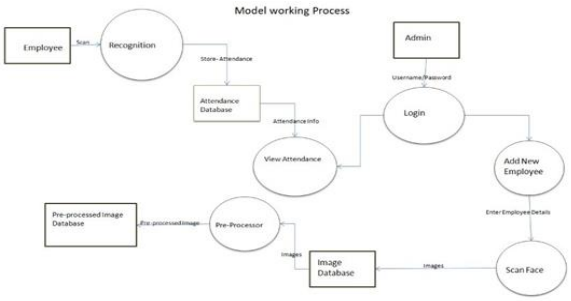
Figure 1. Django MVT

IV. MODEL WORKING PROCESS

The Hr. needs to register the workers and train the engine to identify worker faces using the admin module.

- The Hr. will login and start taking attendance, the workers come facing towards the camera, the system that is already trained to identify the workers based on the data in the database marks the worker presence in the database.
- The Hr. can schedule the shifts for the workers, which will be displayed in the webapp.
- The Hr. can perform analytics on the data which helps in making future decisions.

The System Captures the photos of the Worker during the Registration which is used to train the face recognition engine to attendance of workers.



. Figure 2. Model Working Process

V. Reports and Results

The data is collected while registering the worker and stored into the folder.

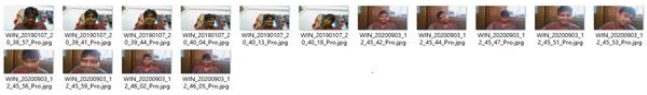


Figure 3. Dataset of a worker

The collected data is used to train the machine and take attendance of the workers.

Figure 4. Face detection of the worker

The admin can update and retrieve the data of the employees at any point of time using the Admin dashboard.

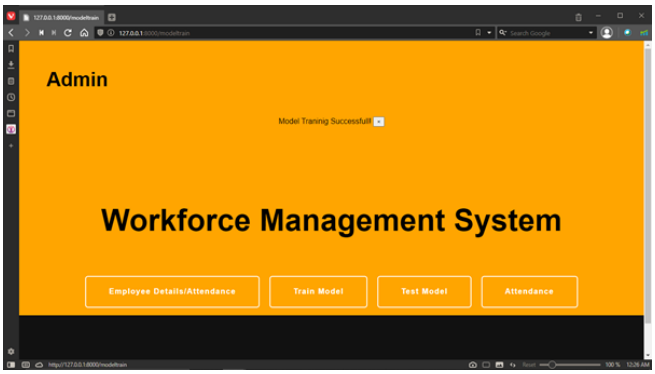


Figure 5. Admin Dashboard

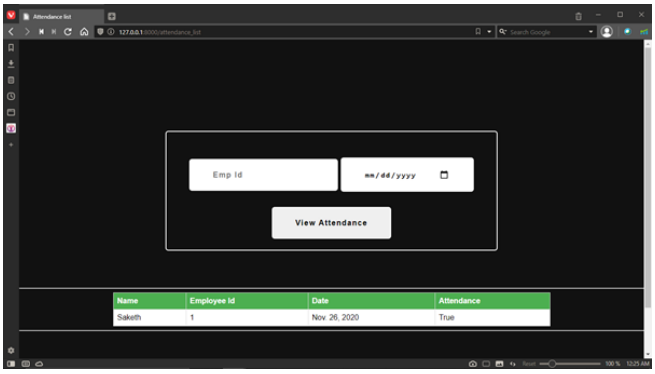


Figure 6. Worker Attendance

The accuracy of the engine was tested using different angles and the accuracy at most turned out to be more than 65%

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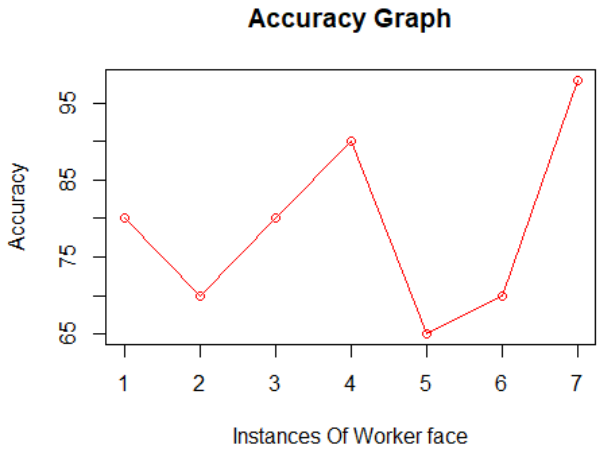

Figure 7. Accuracy timeline of a worker

VI. CONCLUSION

In Conclusion, Workforce Management's future scope is vast as there is a possibility to easily take attendance and view attendance with a simple click through this web application. It is time saving and extremely efficient. We can solve practical problems with this automated system. In this project a user interface is provided with which the admin can easily schedule shifts for the workers. This application can be taken to the next level by adding the payment rollout for the workers.

In future this web application can be used by implementing more advanced software and it can be accessible to admin authorized to take attendance. This project can also be used to increase applicability and usage. Enhancements can be done to maintain all usernames. passwords, email, changing password and other details required for workforce management. An easier and safer way to store the data can be implemented as privacy is an important part of any web application.

VII. References

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