JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

FACE RECOGNITION BASED ATTENDANCE SYSTEM USING RASPBERRY-PI

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Abstract: *In the Face recognition-based attendance system the raspberry-pi is used for image processing in the proposed system's facial detection-based attendance system. To determine whether every student was present or not, we used an image processing concept. Due to its capacity to measure and subsequently identify human identification, face recognition systems are frequently employed for identifying individuals. Using photos of a situation, the Open CV/ Python module is designed to find or confirm one or more people using a database of faces that has been stored. The photos are therefore extracted and made available for comparison with the database images. The image will be sent to an email address if the images match. Therefore, an online user can view this person's image. It can also generate an Excel sheet that can store the information whenever the person is detected according to their entry and exit timing.*

Index Terms- **Raspberry-PI, Open-CV, PI-CAM.**

I. INTRODUCTION

Face recognition-based attendance system is an innovative technology that has become an essential part of the modern world. It allows organizations, businesses, and educational institutions to track attendance accurately and efficiently. The technology helps eliminate the manual process of taking attendance, where there is a higher chance of mistakes and fraud. With this system, individuals' facial features are recognized and matched with a database, ensuring that only authorized individuals are given access to certain areas or events. The rise of artificial intelligence and machine learning has made it possible to develop more advanced systems that can recognize faces in different lighting conditions and angles. The application of face recognition technology in attendance systems is set to transform how organizations conduct their operations, making it easier to manage resources, track attendance and maintain tighter security.

II. METHODOLOGY

Here are the steps:

Step 1: Define your requirements and objectives:

Before starting to develop the system, you need to define what you want to achieve with it and what are the requirements. For instance, you may want to automate the attendance marking process, eliminate the need for paper attendance registers, reduce manual errors, and so on. Gathering requirements will help you design the system accordingly.

Step 2: Data collection and preparation:

To train a face recognition model, you need to collect a dataset of facial images. You can use your own dataset or use existing ones. However, if you decide to create your own dataset, it must be large and diverse enough to capture variations in pose, illumination, facial hair, and so on. Additionally, you need to label your images with individual names/code to enable the model to identify them correctly.

Step 3: Develop a face recognition model:

The next step is to develop and train a deep learning-based face recognition model. There are many pre-built models available which can be fine-tuned based on your requirements. The model should be capable of localizing and recognizing individual faces in real-time.

Step 4: Integrate face recognition with attendance system:

Once the face recognition model is developed, you need to integrate it with the attendance system. The system should capture the image of individuals who enter the premises and then compare it with the stored face recognition model's data to check for a match. If it is a match, the attendance is marked, and if not, the system raises an alert.

Step 5: Test and validate:

Testing and validation are critical before deploying the system to production. You need to ensure that the face recognition model correctly identifies individuals in different lighting and orientation conditions. You can use a validation dataset to measure the accuracy of the model.

Step 6: Deploy and maintain:

Once the system is tested and validated, it can be deployed in production with routine maintenance activities such as data cleaning and model retraining.

In conclusion, developing a face recognition-based attendance system involves collecting data, developing a model, integrating it with the system, testing, and deploying. With the above six steps, you can create a system that automates your attendance marking process, saves time, and reduces manual errors.

III. BLOCK DIAGRAM

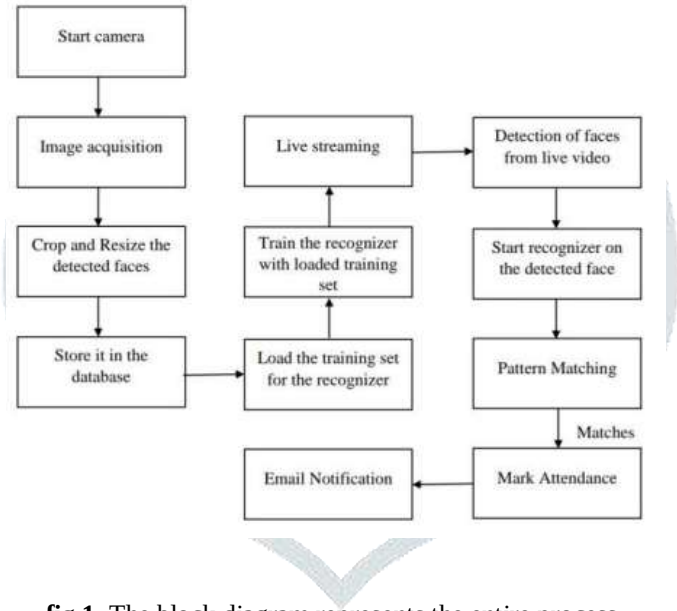

fig 1. The block diagram represents the entire process.

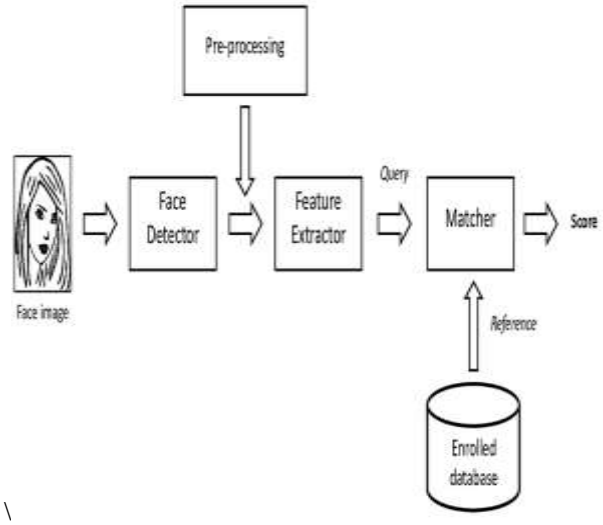

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fig 2. Flow chart.

1. Collect Face Data – The first step is to gather face data of individuals whose attendance needs to be monitored. This data is then used to train the classifier. You can use a camera connected to the Raspberry Pi to capture images of individuals.

2. Set Up Raspberry Pi – Install the required libraries and software on the Raspberry Pi. Libraries like OpenCV and face recognition APIs like dlib can be used to create face recognition systems.

3. Train the Classifier – Train a machine learning classifier using the collected face data. You can use pre-trained models or train the model from scratch using algorithms like Principal Component Analysis (PCA) or Linear Discriminant Analysis (LDA).

4. Run Real-Time Recognition – Once the classifier is trained, the system can be used to recognize individuals in real-time. The cameras capture images of the individuals and compare them to the data stored in the training database.

5. Attendance Management – After recognizing an individual, the system marks their attendance in the database.

6. Feedback & Maintenance – Continuously monitor the system and tweak it as needed based on feedback received. This ensures that the system is accurate and efficient.

The above six steps are the core methodology involved in creating a face recognition-based attendance system using a Raspberry Pi.

IV. HARDWARE

The hardware components of a face recognition-based attendance system include:

1. Camera: A camera with high-resolution is used to capture the image of the faces of the users.

2. Processor: A processor is used to process the images and convert them into data that can be used by the software.

3. Memory: Memory is needed to store the data of the users, including their biometric data.

4. Display: A display is needed to show the users their attendance status.

5. Communication devices: Communication devices such as Wi-Fi or Bluetooth are used to transmit data to the database.

6. Power supply: A reliable power supply is required to ensure that the system operates without any disruptions.

RASPBERRY-PI-

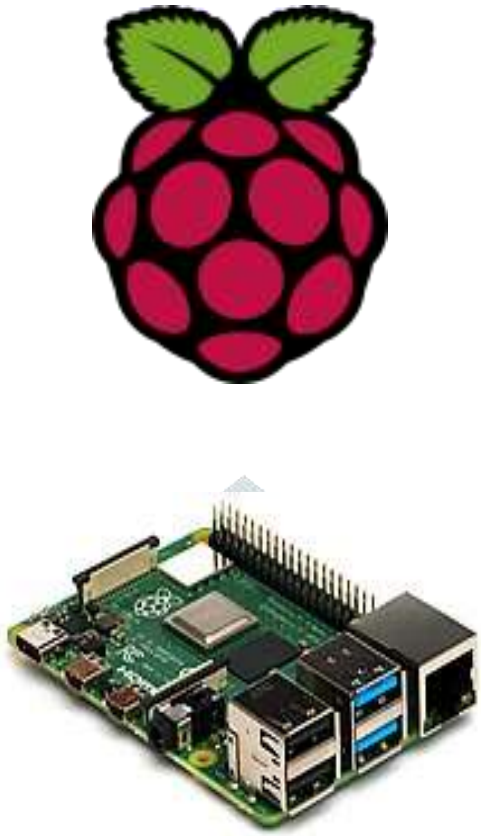

fig 3. Raspberry-PI

Raspberry Pi is a small, single-board computer that can be used for a variety of applications, including IoT-based systems. It is an affordable and versatile computer that can run various operating systems, including Linux, and can be programmed using various programming languages. The Raspberry Pi board includes several components, including a processor, memory, input/output pins, and USB ports. These components allow the Raspberry Pi to connect to various sensors and peripherals, making it an ideal platform for IoT-based systems. In the proposed IoT-based crop protection system, Raspberry Pi acts as a central processing unit to control the entire system. It receives images captured by the camera module and processes them using machine learning algorithms to identify animals. When the system detects any stray animal movement, the Raspberry Pi triggers the alarm to alert the farmers. Raspberry Pi's affordability and versatility make it an ideal platform for developing IoT-based systems, particularly in the agricultural sector. Its low power consumption and ability to run on battery power also make it suitable for use in remote locations where power may be limited.

PI- CAM –

Fig 4. PI-cam

The Pi cam is a camera module designed for the Raspberry Pi computer that can serve as an integral part of a face recognition-based attendance system. The camera module is able to capture high-quality images of individuals and process them within the software algorithms to recognize the individuals based on their facial features, allowing the attendance system to automatically track and record attendance of each individual. Face recognition features of the Pi cam are based on machine learning and artificial intelligence technologies, which enable the system to efficiently and effectively identify individuals, regardless of any minor

changes in the facial appearance. The Pi cam can be integrated with several different attendance tracking software programs available in the market. The use of Pi cam in face recognition-based attendance systems is a cost-effective and efficient alternative to traditional attendance-tracking methods, reducing labor costs and increasing accuracy. In this project we use the PI cam but the web cam or any other camera also used for the detection purpose.

IV. RESULTS AND DISCUSSION

Firstly, we have to connect our raspberry-pi and the desktop with the same WIFI or Ethernet. After successfully login to raspberry-pi. We have to run our file in which our python code and trained data is saved. A pop window panel is open for the face detection and when a face is matched with the saved data attendance is automatically saved in the excel sheet also the data of the whole day is sent via mail. This is the image of the detected person and the square box shows the detected person.

fig 1. Face Detection

Based on the label of the detected person the data is automatically feed to the excel sheet.

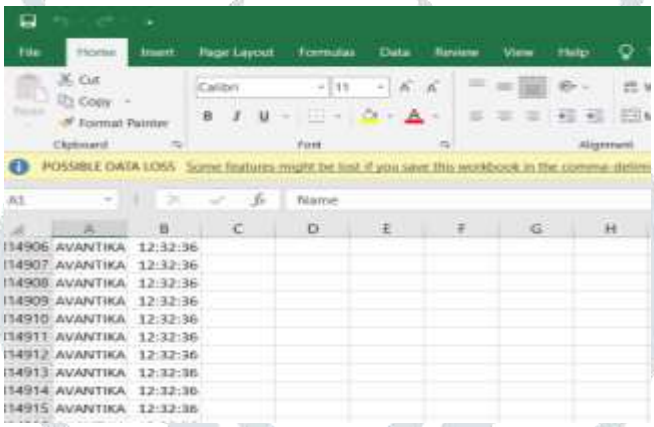

fig 2. Excel Sheet

Face recognition technology is becoming more popular due to its accuracy, convenience, and speed. It eliminates the need for traditional attendance methods such as manual entry, swipe cards or badges, and reduces the time that employees have to spend on signing in and out.
Some advantages of a face recognition-based attendance system include:

1. Accuracy: The system can accurately identify individuals, reducing the chances of errors or fraudulent activity.

2. Convenience: The system is easy to use, and employees do not have to carry any physical identification cards, making it more convenient and efficient.

3. Security: The system can detect unauthorized individuals who may try to access restricted areas.

4. Time-saving: The system saves time as there is no need for manual data entry or paperwork.

REFERENCES

[1] Hapani, Smit, et al. "Automated Attendance System Using Image Processing." 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA). IEEE, 2018.

[2] Akbar, Md Sajid, et al. "Face Recognition and RFID Verified Attendance System." 2018 International Conference on Computing, Electronics & Communications Engineering (iCCECE). IEEE, 2018.

[3] Okokpujie, Kennedy O., et al. "Design and implementation of a student attendance system using iris biometric recognition." 2017 International Conference on Computational Science and Computational Intelligence (CSCI). IEEE, 2017.

[4] Rathod, Hemantkumar, et al. "Automated attendance system using machine learning approach." 2017 International Conference on Nascent Technologies in Engineering (ICNTE). IEEE, 2017.

[5] Siswanto, Adrian Rhesa Septian, Anto Satriyo Nugroho, and Maulahikmah Galinium. "Implementation of face recognition algorithm for biometrics-based time attendance system." 2014 International Conference on ICT For Smart Society (ICISS). IEEE, 2014.

[6] Lukas, Samuel, et al. "Student attendance system in classroom using face recognition technique." 2016 International Conference on Information an

[7] Smitha, Pavithra S Hegde, Afshin **"**Face Recognition based Attendance Management System" Dept. of Computer Science and Engineering Yenepoya Institute of Technology Moodbidri, India. International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV9IS050861 ,Vol. 9 Issue 05, May-2020.

[8] G. T.S.Lim Fac., Ayer Keroh,Malaysia S. C. Sim ; M. M. Mansor. 2009. RFID based attendance system Industrial Electronics and Applications. ISIEA 2009. IEEE Symposium on (Vol. 2).

[9] Quan-Xi, Li Gang M. 2012. An Efficient Automatic Attendance System Using Fingerprint Reconstruction Technique IJCSIS International Journal of Computer Science and Information Security.

[10] U. Eze peter; Owerri Nigeria; C.K.A. JoeUzuegbu; Laz Uzoechi; F.K. 2013. Opera biometric based attendance system with remote real time monitoring tertary institutions in developing countries emerging and sustainable technologies for power and ICT in a developing society NIGERCON, IEEE.

[11] Design and implementation of iris based attendance management system Electrical Engineering and Information Communication Technology (ICEEICT), 2015 International Conference.

[12] Adam Schmidt, Andrzej Kasinski, "The Performance of the Haar Cascade Classifiers Applied to the Face and Eyes Detection", Computer Recognition Systems 2016.

[13] Amit Kumar, P.K. Varma, Srinivas Perala, P. R. Chadha, "Automatic Attendance System By Visual Programming Language LabVIEW," in IEEE International Conference On Power Electronics, Intellegent Control and Energy System 2016

[14] Ruian Liu Mimi Zhang Shengtao Ma, "Design of Face Detection and Tracking System", 2010 IEEE 3rd International Congress on Image and Signal Processing.

[15] Automated attendance management system based on face recognition algorithms Computational Intelligence and Computing Research ICCIC), 2013 IEEE International Conference.

[16] Yung-Mao Lu ; Nat. Kaohsiung Univ. of Appl. Sci., Kaohsiung; Bin Yih Liao; Jeng-Shyang Pan. 2008. A face recognition algorithm decreasing the illumination effect intelligent information hiding and multimedia signal processing. 2008 IIHSP"08 IEEE.

[17] Rafael C. Gonzalez. 2009. Digital Image Processing. Pearson Education India. 11. Yi-Qing Wang. 2014. An Analysis of the Viola-Jones Face Detection Algorithm. Image Processing On Line. 4: 128-148.