FACE RECOGNITION ATTENDANCE SYSTEM

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Course Project Phase 1-report

- **Literature Review**

1.Face Recognition-based Attendance Management System by Smitha, Pavithra S Hegde, Afshin Dept. of Computer Science and Engineering Yenepoya Institute of Technology Moodbidri, India

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face ID. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

2. Face Recognition Based Attendance System by Nandhini R, Duraimurugan N, S.P.Chokkalingam

This paper aims to capture the video of the students, convert it into frames, relate it with the database to ensure their presence or absence, and mark attendance to the particular student to maintain the record. The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation

3. Face Recognition System Using in Attendance for Educational Institution by Deepan K , Manoj Kumar S, Maheswari M, Balaji A S

The paper reviews the implementation of face recognition systems for attendance tracking in educational institutions, focusing on deep learning and computer vision techniques. It outlines the challenges faced by traditional attendance methods and highlights the benefits of face recognition technology, such as improved accuracy and efficiency. Through a thorough examination of related works, the paper identifies methodologies and technologies used in existing systems to enhance recognition reliability. Overall, the proposed system offers a promising solution to automate attendance management and improve overall efficiency in educational environments.

4. Real-Time Face Recognition for Attendance Management System Using Deep Learning (2022) by Himanshu Tiwari ,Research Scholar of Banaras Hindu University ,Department of Chemical Engineering

This paper proposes a real-time attendance system using deep learning for high-accuracy student recognition. It utilizes Convolutional Neural Networks (CNNs) to extract facial features and achieve robust identification even with lighting, pose, or expression variations. The system operates in real-time, efficiently marking attendance without delays. It stores student data in a database for easy access and analysis. The paper acknowledges challenges like low-light conditions and duplicate attendance, but suggests potential solutions. Overall, this deep learning approach offers a promising and practical solution for automated attendance management in education.

5.Challenges and Limitations of Facial Recognition Attendance Systems **(**article was created with the help of AI and the LinkedIn community)

This is an article about the challenges and limitations of face detection and recognition. It discusses the variability of faces, the diversity of datasets, the complexity of algorithms, privacy and ethics, and future directions. Facial recognition can be difficult because faces vary in shape, size, pose, expression, and more. Datasets used to train facial recognition systems may also be biased or inaccurate. The algorithms themselves need to be accurate, efficient, and fast. There are also privacy concerns, as facial recognition can be used to track and identify people.

- **Problem Definition**

Manual attendance management in the classroom requires a lot of human effort and is prone to mistakes, especially when using a paper-based system. It requires a significant amount of human effort and can lead to inaccuracies. Large classrooms or institutions make this challenge even more difficult to manage efficiently. Therefore, an automatic attendance system is essential to simplify the process, reduce administrative burden, and improve accuracy. The goal of this system is to make attendance tracking easier while maintaining accuracy and reliability. By automating the process, human error is reduced and time is saved, especially in busy educational settings. Replacing manual methods improves efficiency and facilitates smooth attendance recording. The introduction of a system like this marks an overall change in attendance management procedures by providing a stable answer that can be customized for different types of educational environments.

- **Tentative solution**

Our proposed solution involves the development of a Face Recognition Attendance System to address the challenges associated with manual attendance management in classrooms. The system will be implemented using Python programming language. Initially, student information, including photos and names, will be stored in the system's database for each enrolled course. Before entering the class the system will utilize face recognition technology to identify and mark the attendance of students. Upon successful recognition, the attendance data will be recorded and stored in a spreadsheet for further reference and analysis.

Our solution attempts to simplify human effort and lessen the administrative load on teachers by automating the process of marking attendance. It reduces errors and guarantees accurate attendance records by doing away with the necessity for human attendance taking. Furthermore, by reducing the amount of time needed for manual data entry, the system will increase efficiency. Additionally, a dependable and safe way to track attendance is through the use of facial recognition technology. Teachers will have an easy-to-use and efficient tool for keeping track of student’s attendance in the classroom after this system is put into place. Additionally, it will make it easier to analyze attendance patterns for students and spot patterns or potential improvement areas.

- **Proposed methodology**

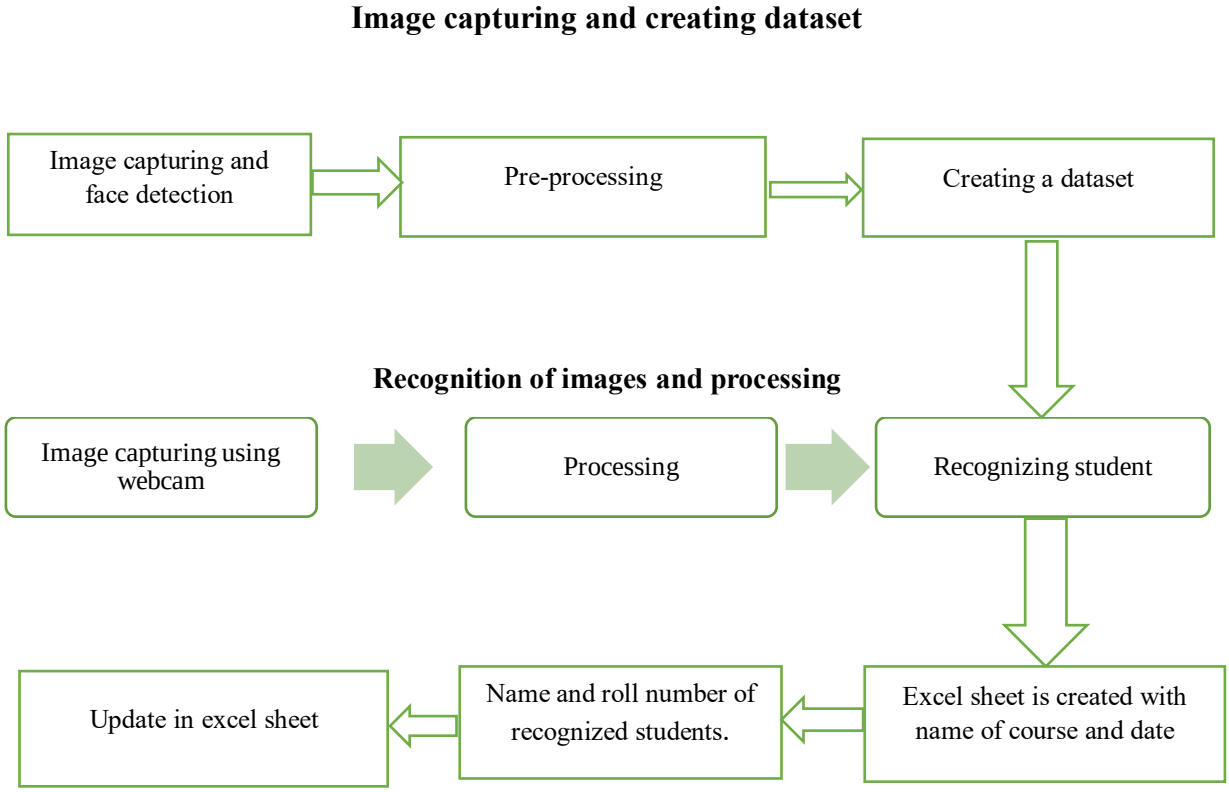
Data collection and preprocessing: First, gather a dataset that includes the photos, names, and roll numbers of all students who are enrolled in IMS for a particular course. Ensure that the collected images are clear and of high quality; if any images are unclear or of poor quality, update them accordingly. This dataset will be utilized as the foundation for the face recognition model.

Accessing webcam: The Webcam of the system is accessed using the OpenCV library.

Image capture: The image of each student is captured using the webcam. If the image is of poor quality or positioning is not correct then recapture the image.

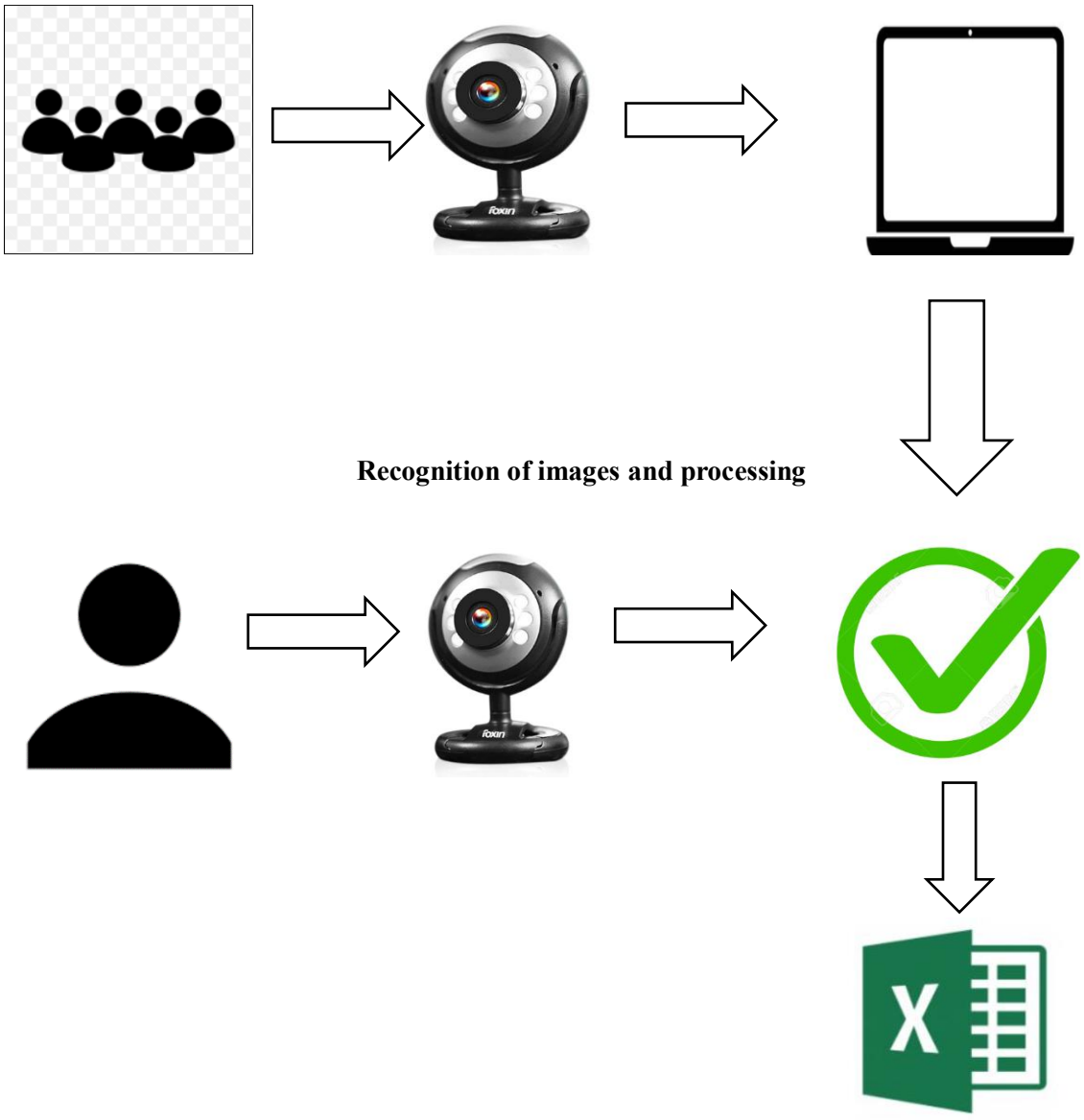
Processing and marking attendance: An Excel sheet is created first with the name of the course and date. If the captured image is the same as the one in our database then mark present along with name and roll number in the spreadsheet. If the captured image does not match with the database then shows as "Not registered for this course".

Block diagram



- **Design**

Image capturing and creating dataset



Recognition of images and processing

- **Tools and Technology:**

Tools and Technologies used are:

- Python 3.7, 3.8, or 3.9
- OpenCV library (cv2)
- NumPy library
- face_recognition library
- XlsxWriter library

The code uses a webcam to capture images of people and then uses face recognition to identify them. The names of the people along with roll numbers were stored in an Excel spreadsheet along with the date.

In this project, a combination of tools and technologies is employed to create a sophisticated face recognition system for Attendance using Python 3.7, 3.8, or 3.9. Combining the power of computer vision, the OpenCV library (cv2) is utilized to capture real-time images from a webcam, forming the foundation of the face recognition process.

OpenCV, a widely used open-source computer vision and machine learning software library, provides a set of tools for image processing and analysis. Its makes an ideal choice for tasks ranging from basic image manipulation to complex computer vision applications. In this project, OpenCV enables the capture of high-quality images, facilitating accurate face recognition.

The NumPy library plays a pivotal role in handling numerical operations and arrays, enhancing the efficiency and speed of the image processing pipeline. By utilizing NumPy, the project benefits from optimized array operations, enabling seamless integration with the OpenCV library. This integration enhances the overall computational performance, ensuring swift and precise data handling during face recognition tasks.

To achieve the core functionality of identifying faces, the project incorporates the face_recognition library. This specialized library builds upon dlib, a machine learning toolkit, to provide advanced face recognition capabilities. By harnessing the power of deep learning models, face_recognition enables the system to accurately recognize and distinguish faces in real-time, creating a robust and reliable identification mechanism.

In addition to the image processing and face recognition components, the project leverages the XlsxWriter library to seamlessly interface with Microsoft Excel. This library allows the system to dynamically generate Excel spreadsheets, providing a structured and organized format for storing information. The integration of XlsxWriter facilitates the automated logging of identified individuals who attended class, along with the corresponding roll number and date, creating a comprehensive record of face recognition events.

We've built a face recognition system using Python as the main programming language. We've combined it with libraries like OpenCV, NumPy, and face_recognition to make it work smoothly. This setup ensures the system can accurately recognize faces and also comes with an easy-to-use interface for keeping track of people it identifies.