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Deep Learning Face Recognition in Real-Time for Library Check-In and Check-Out System

Dr. M. Gayathri[1], B. Keerthana[2], U. Renu Sree[3]

[1]Dept of CSE, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram, India, mgayathri@kanchiuniv.ac.in
[2]Dept of CSE, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram, India, bhumikeerthana@gmail.com
[3]Dept of CSE, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram, India, renusree1206@gmail.com

ABSTRACT

The most widely used and popular technology nowadays is face recognition. It works well to provide machine vision so that it can interact with people more effectively. If machines can read our faces, then our form of life will reflect that. The world will enter a new dimension according to face recognition technology. Finding identity and security will be advantageous in many ways. The identification and verification of a person using their facial features are done by a facial recognition attendance system, which also uses technology to automatically mark attendance. The software can be utilized by a variety of users, including employees, students, and others. Real-time data collection and data storage is done by the system.

In this article, we describe a face-recognition smart library system that does away with the majority of the difficult things that traditional library management systems require. A real-time attendance system based on human face recognition and basic algorithms is the library management system. Before, each library user's login and logout details were manually entered into records (books). By keeping books, there is a chance of data loss, and multiple records might be challenging to keep up with. Given this, we are putting up a clever method for maintaining faculty/student login and logout library information using CNN, or Convolution Neural Networks, a type of Deep Learning technology based on face recognition.

Keywords **-** face recognition, Library Check In Check Out, CNN, Deep Learning.

1. INTRODUCTION

For the creation of modern electronic security systems, real-time facial recognition is essential. It is a technique for verifying or identifying someone by their face. People can be recognized using facial recognition technology in real-time or in still images and videos. Using facial recognition as a verification method is rapid and effective. Compared to other biometric technologies like fingerprint or retina scans, it is quicker and more efficient. When identifying people, facial recognition is more efficient than using just a phone number, email address, address, or IP address. Face detection, feature extraction, and face recognition are the three steps that make up real-time face recognition. Automatic face recognition is a challenging problem that has recently attracted a lot of interest. There are many proposed techniques to locate and identify human faces in a dataset in this field. It is hard to count people to figure out who is in a class or library. We can use a printed checklist or a biometric system, like a fingerprint, to verify their presence. Yet, these methods waste time because individuals must line up just to provide identification. So, this kind of problem can be resolved using face recognition technology. Facial recognition technology uses CCTV cameras to capture images of students and library visitors. In this project, the dashboard website and the facial recognition system will be combined to define the system's goals. The dashboard website was made using an open-source Python framework for building web-based analytical programs.

2. MATERIALS AND METHODS

2.1 EXISTING SYSTEM

The YOLO Algorithm, an object detection technique that separates images into a grid system, is necessary for the current system. The system keeps track of faculty and student login and logout information and allows for the automated recording of user entrance and exit times. The system doesn't require the visitor to wait in line before leaving the library because of the device. Yet this system has certain drawbacks. Very few things are more challenging to identify in this system, and object positions are less accurately recognized.

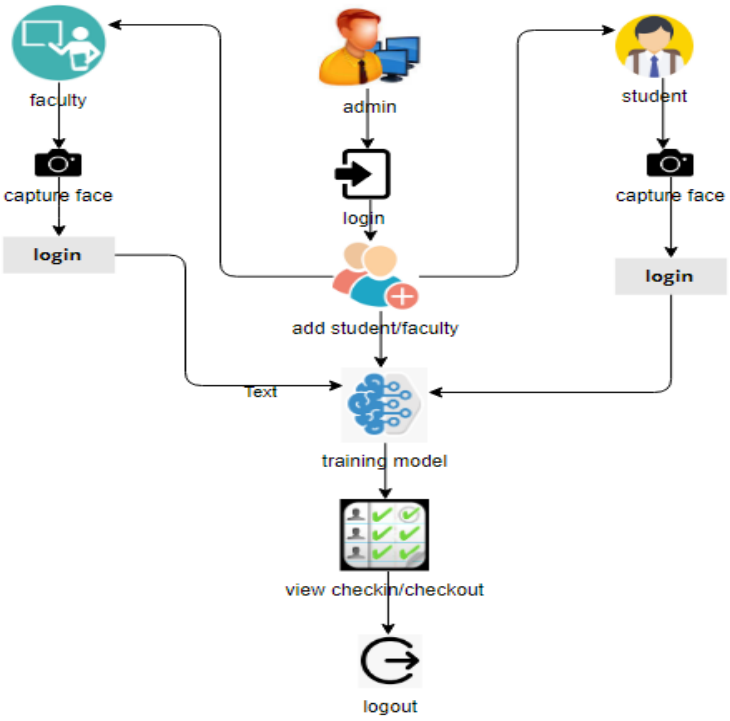
2.2 PROPOSED METHOD

In the proposed system, we are using the CNN algorithm for face recognition and the check-in check-out system. This system has the features to solve the current problems, as Students/Faculty can see their check-in and check-out details and receive their login details in their mail. Additionally, if an unknown person enters the library, the camera will detect the person as unknown and the admin will immediately get alerted by receiving an SMS. It is fully automatic, scalable, and user-friendly.

Advantages:

- Easy to maintain Student/faculty check-in and check-out details
- High Performance
- Secure the data

2.3 ARCHITECTURE



2.4 ALGORITHM

Convolutional Neural Network

A Deep Learning-based system called Convolutional Neural Network (CNN) can take images as input and classify the objects in the image. One is separated apart from the other by it. Comparing ConvNet to other classification techniques, the preprocessing is substantially less. To compress the images without losing features, ConvNet is utilized, which aids in making the correct prediction. By using the appropriate filters, it may effectively capture the spatial and temporal dependencies in an image. The model was chosen for its ability to run on the least amount of computing resources, have great detection accuracy, and require few training parameters.

Simple features like edges, corners, endpoints, etc. can be classified using ConvNet's layers that are closer to the input. Yet, the simple features are divided into complex features by layers that are present at a deeper level. Finally, the top layer combines all the complex features and offers a prediction.

High-level neurons do all fine detail recognition in the convolutional layer. Afterward, these high-level neurons determine whether each pattern is present. By sequencing the image, features are detected and verified to be there. The ConvNet entirely loses all of the information regarding the build and positioning of the components during the process, and it then passes the information to a neuron that could not able to classify the image.

Depending on whether a certain feature is visible in the image or not, CNNs make predictions. Classify the image as appropriate if the required components exist.

3. RESULTS

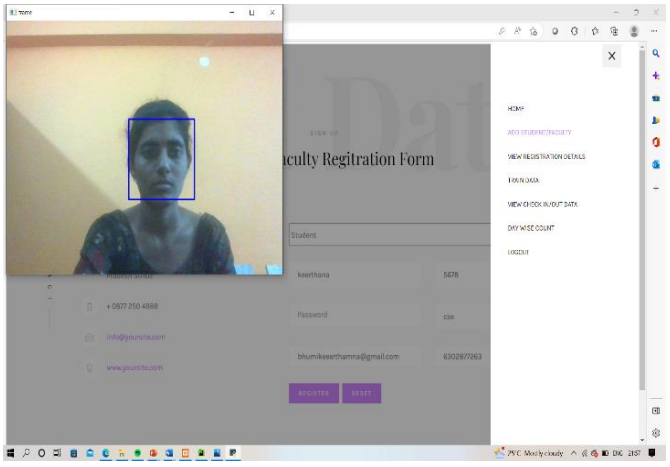


Figure 1: Training the image with data

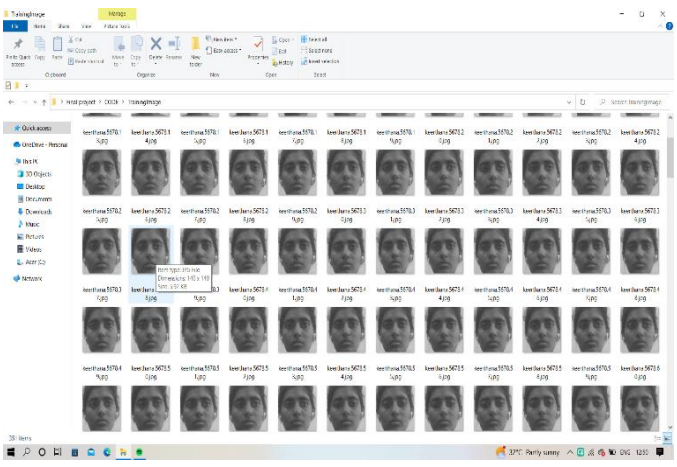


Figure 2: Images stored in the database

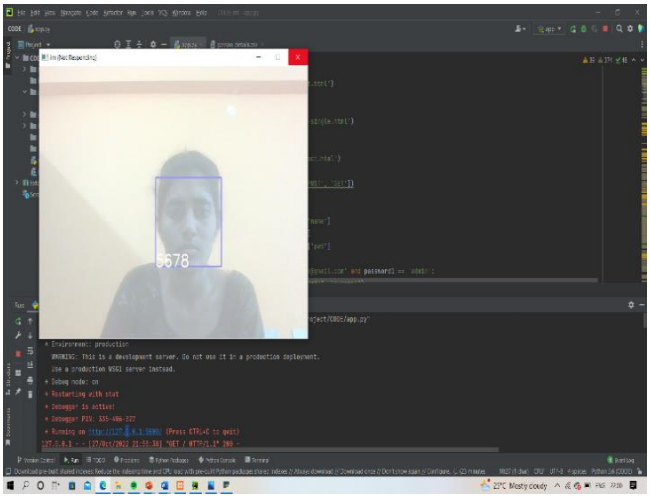


Figure 3: Real-time facial recognition

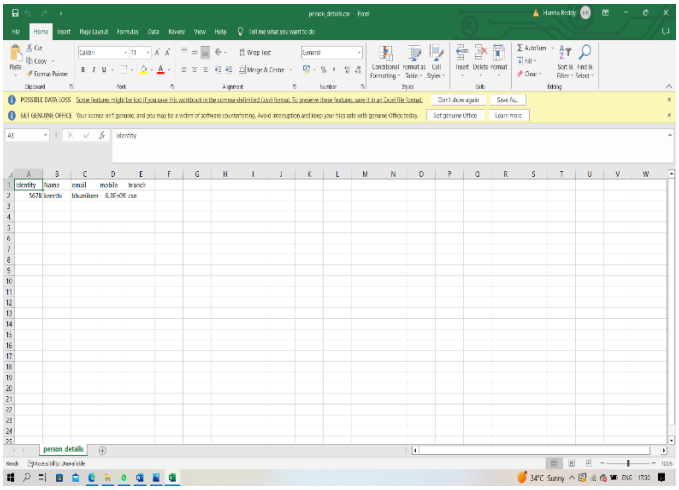


Figure 4: Writing attendance data to a CSV file

4. CONCLUSION

According to the project's study, we successfully proposed the Library Management System. Real-time facial recognition is used to track staff and students as they visit the library by registering each of their faces with the aid of OpenCV technology and the Deep Learning CNN algorithm.

5. FUTURE ENHANCEMENT

This project has the potential to be developed further. The very following day, popular technology is no longer relevant. The method might be improved further to maintain the abstract of technological advancements. Even though, it will get better with more improvements. Even better, we can update it with new changes. A database of different books that are available in the library and a list of books that have been issued to specific readers can also be included. The system records every available book as well as every book that has been issued to different readers for the duration for which the book has been issued. As a result, the project can always be upgraded with improved features.

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