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AI Based Student Attendence Monitoring System

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ABSTRACT: In many of the educational institutions, managing attendance of students/candidates is tedious, as there would be large number of students in the class and keeping track of all is onerous. There are situations where student act as proxies for their friends even though they are not present. The advancement in the history of computer vision utilizing deep learning approaches especially convolutional neural networks have accomplished to solve difficult problems in face recognition field. Face recognition-based approach is one amongst the important identification methods which can be used as a possible substitution for conventional system of marking attendance manually, especially if a huge classroom of students is addressed for an hour session. Our solutions integrate AI capabilities with smart analytics features to facilitate transparency in classrooms and college campus. This project develops an automatic attendance system using Faster R-CNN deep learning-based algorithm. In this system, a database containing the trained student's face. A camera installed in the college campus captures the face of all the student in the classroom and other places too. This face image is processed using FRCNN algorithms to detect faces and to mark the attendance automatically in an excel sheet. The system records the entire class session and identifies when the student's pay attention in the classroom, and then reports to the facilities and also this system can record violations of classroom, that is absence, roaming around the college campus during the class hours and send alert message to the H.O.D. This dynamic attendance system uses face recognition as an important aspect of taking attendance which saves time and proxy attendance and is avoided. The system identifies faces very fast needing only 100 milliseconds to one frame and obtaining a high accuracy. Our face recognition model has an accuracy rate of 98.87%.

KEYWORDS: Python, FRCNN Algorithms.

I. INTRDUCTION

The human face is an important entity which plays a crucial role in our daily social interaction, like conveying individual's identity. Face recognition is a biometric technology that extracts the facial features mathematically and then stores those features as a face print to identify the individual. Biometric face recognition technology gained a lot of attention during the past few years due to its wide range of applicability in both law enforcement and other civilian areas, institutes and organizations. Face recognition technology has a slight edge on other biometric systems like finger-print, palm-print and iris due to its non-contact process. Face recognition system is also able to recognize the person from a distance without touching or any interaction with the person. Moreover, the face recognition system also helps in crime deterrent purpose, because the captured image can be stored in a repository and later can be helpful in many ways like to identify a person. Currently, face recognition applications are deployed in social media websites like Facebook, in the entrance of Airports, Railways Stations, Bus Stop, highly secured areas, advertisement, and health care. The purpose of these applications is to minimize criminal activities, fake authentication, tracking addictive gamblers in casinos, whereas Facebook is using face recognition system for automatic tagging purpose. For face recognition purpose, there is a need for large data sets and complex features to uniquely identify the different subjects by manipulating different obstacles like illumination, pose and aging. During the recent few years, a good improvement has been made in facial recognition systems.

II. EXISTING SYSTEM

Manual attendance calling, self-reporting attendance systems (using tools like Google forms), video calling students, short quizzes or polls, questions and discussions by selecting random students, and timed assignments. In the

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case of physical classrooms, biometric-based attendance monitoring systems are essentially based on face, fingerprint, and iris recognition technologies Facial recognition is a technology that is capable of recognizing a person based on their face. It employs machine learning algorithms which find, capture, store and analyses facial features in order to match them with images of individuals in a pre-existing database. Early approaches mainly focused on extracting different types of hand-crafted features with domain experts in computer vision and training effective classifiers for detection with traditional machine learning algorithms. Such methods are limited in that they often require computer vision experts in crafting effective features, and each individual component is optimized separately, making the whole detection pipeline often sub-optimal. There are many existing FR methods that achieve a good performance

III. LITERATURE SURVEY

The model focuses on how face recognition incorporated with Radio Frequency Identification (RFID) detect the authorized students and counts as they get in and get out form the classroom. The system keeps the authentic record of every registered student. The system also keeps the data of every student registered for a particular course in the attendance log and provides necessary information according to the need.it have designed and implemented an attendance system which uses iris biometrics.

Initially, the image of each attendee, recognizing their iris, and searching for a match in the created database. The prototype was web attendees were asked to register their details along with their unique iris template. At the time of attendance, the system automatically took class attendance by capturing the eye based. proposed an attendance system based on facial recognition. The algorithms like Viola-Jones and Histogram of Oriented Gradients (HOG) features along with Support Vector Machine (SVM) classifier were used to implement the system. Various real time scenarios such as scaling, illumination, occlusions and pose was considered by the authors. Quantitative analysis was done on the basis of Peak Signal to Noise Ratio (PSNR) values and was implemented in MATLAB GUI.

Based on the experiments carried out in this paper, the ROC curve proved that, Eigenface achieves better result than Fisherface. System implemented using Eigenface algorithm achieved an accuracy rate of 70% to 90%. A method for student attendance system in classroom using face recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT). These algorithms were used to extract the features of student's face followed by applying Radial Basis Function (RBF) for classifying the facial objects. This system achieved an accuracy rate of 82%.

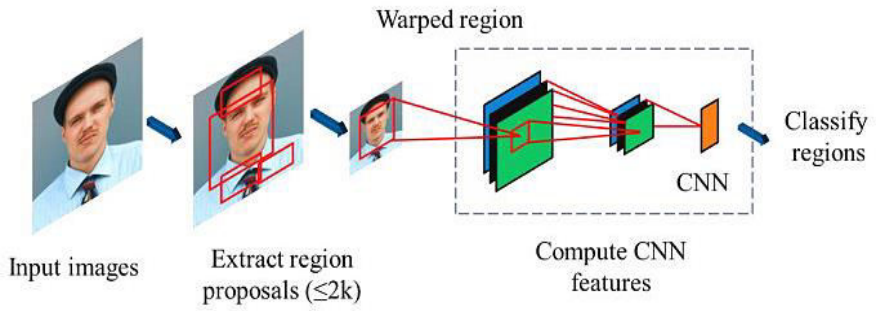

Fig 1: Feature Extraction using Fast – RCNN

III. PROPOSED SYSTEM

This paper proposed a system that can automatically attend using surveillance cameras. The camera will be installed in front of the class in an area that can reach all parts of the class and other area of the campus including vehicle stand, canteen, seminar hall, library etc. Propose a deep unified model for Face Recognition based on Faster Region Convolution Neural Network. Furthermore, by using a face detection system, the camera will mark the part of the frame from the captured image which is the face of students in a class and other area. The process is continued with an introduction to the face that has been detected so that it will automatically be kept a record that the student is present in the class or outside the class with a specific course and time.

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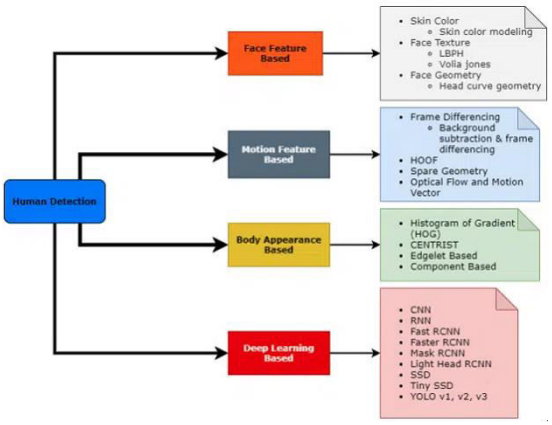

Fig 2: Flow Diagram for Human Detection

Facet Detection R-CNN:

The R-CNN detection first generates region proposals using an algorithm such as edge boxes. The proposal regions are cropped out of the image and resized. The CNN classifies the cropped and resized regions. Finally, the region proposal bounding boxes are refined by a support vector machine (SVM) that is trained using CNN features .

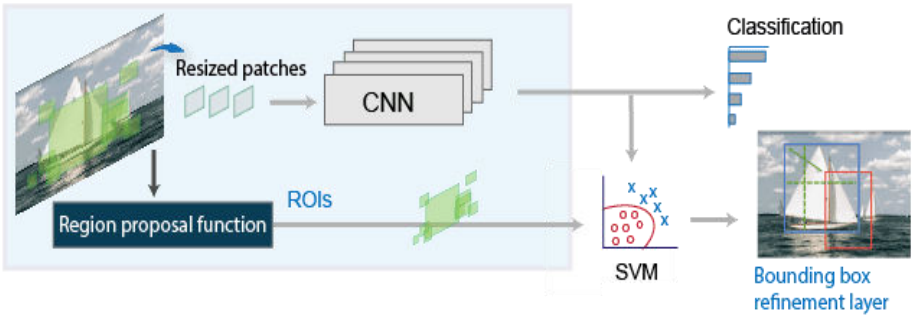

Fig 3: Resized patches of CNN

Design of R-CNN

The basic R-CNN model starts with a pre-trained network. The last three classification layers are replaced with new layers that are specific to the object classes you want to detect.

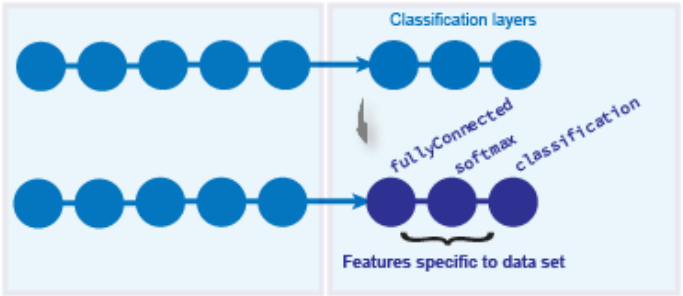

Fig 4: Features Specific to Data Set

- **Feature Extraction - Fast R-CNN**

As in the R-CNN detector, the Fast R-CNN detector also uses an algorithm like Edge Boxes to generate region proposals. Unlike the R-CNN detector, which crops and resizes region proposals, the Fast R-CNN detector processes the entire image. Whereas an R-CNN detector must classify each region, Fast R-CNN pools CNN features

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corresponding to each region proposal. Fast R-CNN is more efficient than R-CNN, because in the Fast R-CNN detector, the computations for overlapping regions are shared.

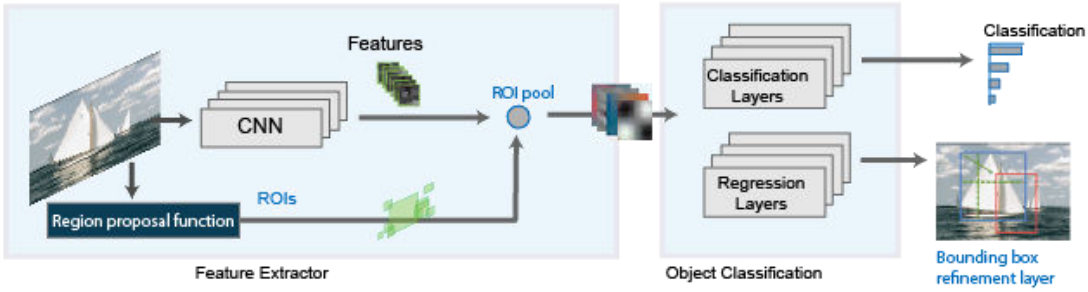

Fig 5: Features Region Proposal Function

- **Face Recognition - Faster R-CNN**

The Faster R-CNN detector adds a region proposal network (RPN) to generate region proposals directly in the network instead of using an external algorithm like Edge Boxes. The RPN uses Anchor Boxes for Object Detection. Generating region proposals in the network is faster and better tuned to your data.

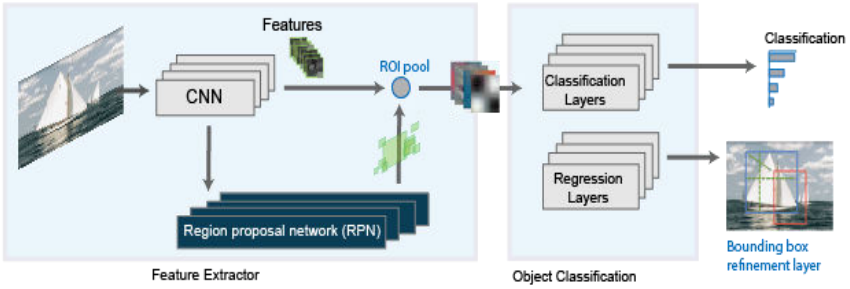

Fig 6: Diagram Of Faster R-CNN

Design of Faster R-CNN

The Faster R-CNN model builds on the Fast R-CNN model. A region proposal network is added to produce the region proposals instead of getting the proposals from an external algorithm.

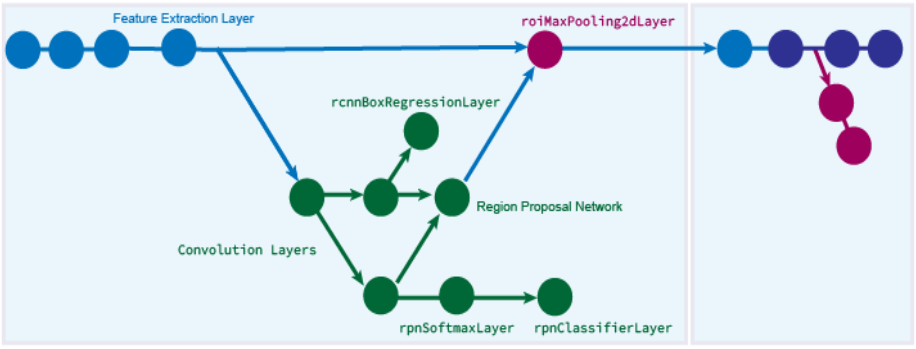

Fig 7: Feature of Extraction Layer

- **Attendance System**

After the verification of faces and successful recognition is done, the attendance of the student is marked in front of his/her roll number. If the face is not recognized, an error page is displayed. It involves the attendance report generation. The module takes student information and daily attendance status from student database. The attendance is

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calculated as per requirement. There are options for calculating day-wise, student wise and class-wise attendance. The attendance reports are generated and saved in a file.

- **Warning System**

Our students' parents have access the notification services, where all the marks and activities, as well as the student's attendance, are recorded; now, they will also be notified of the attendance by SMS. The parent knows where their child is at any time – and this is one of the greatest parental cares and interests. Even when you have no internet access, you receive messages on your mobile device, notifying you of your child's arrival time and any missed lessons, so you can check on your child right away and provide assistance if needed.

IV. RESLIT

SCREENSORT:

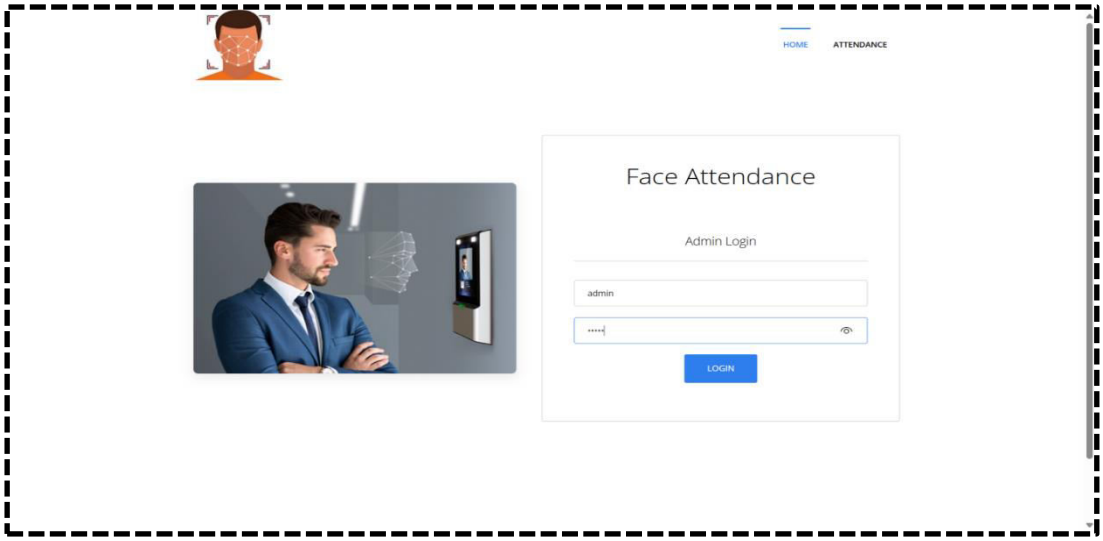

Fig 8: Admin Login page

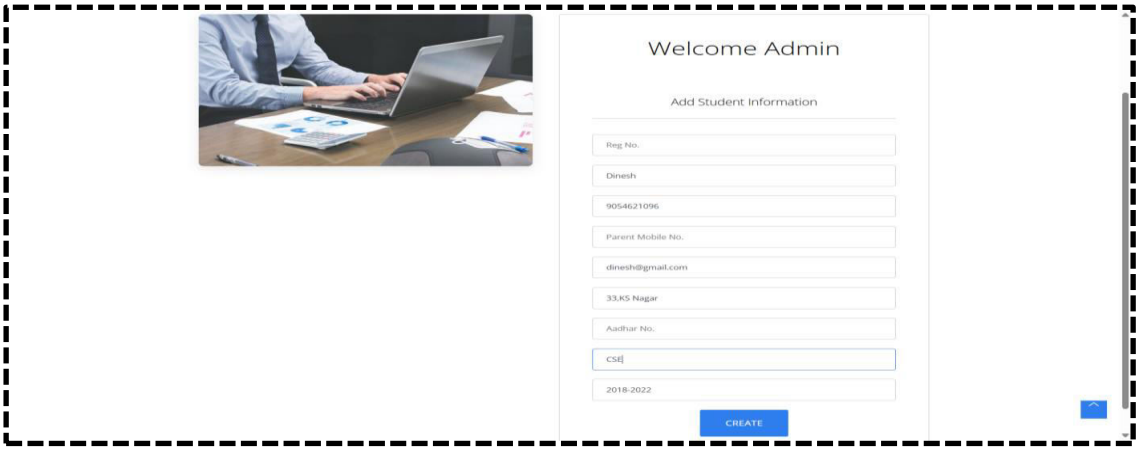

Fig 9: Add Student Information

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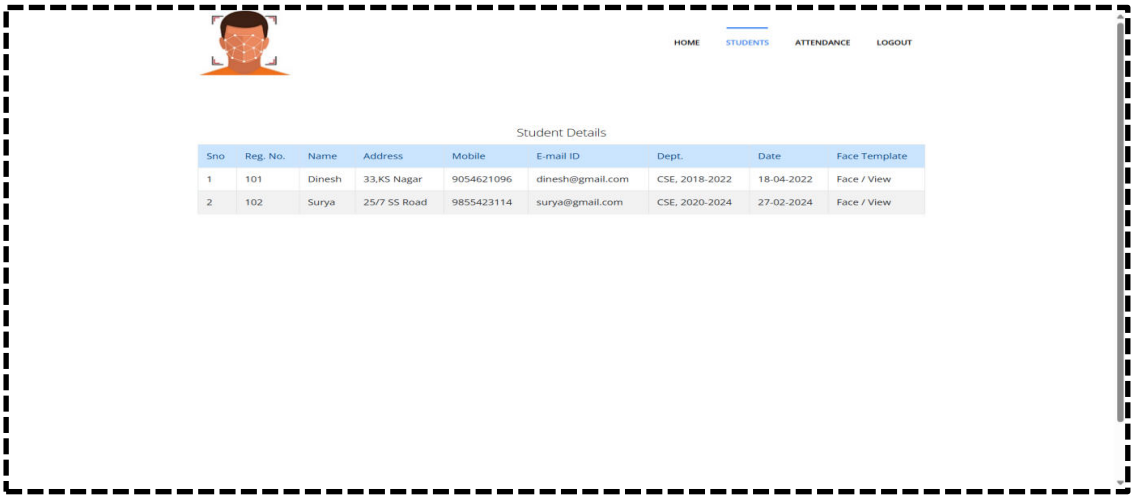

Fig 10: Student Details

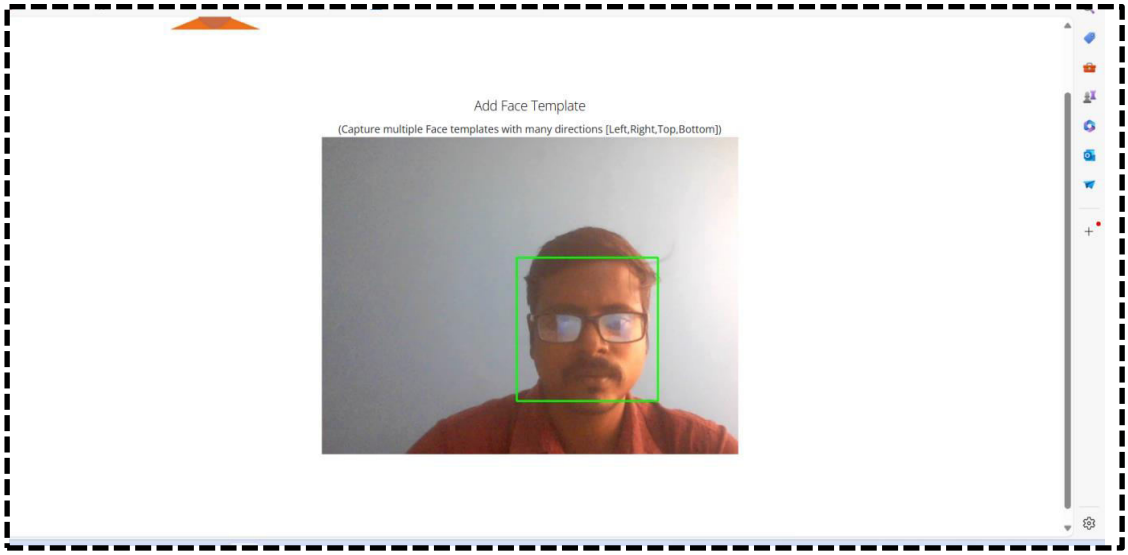

Fig 11: Add Face Template

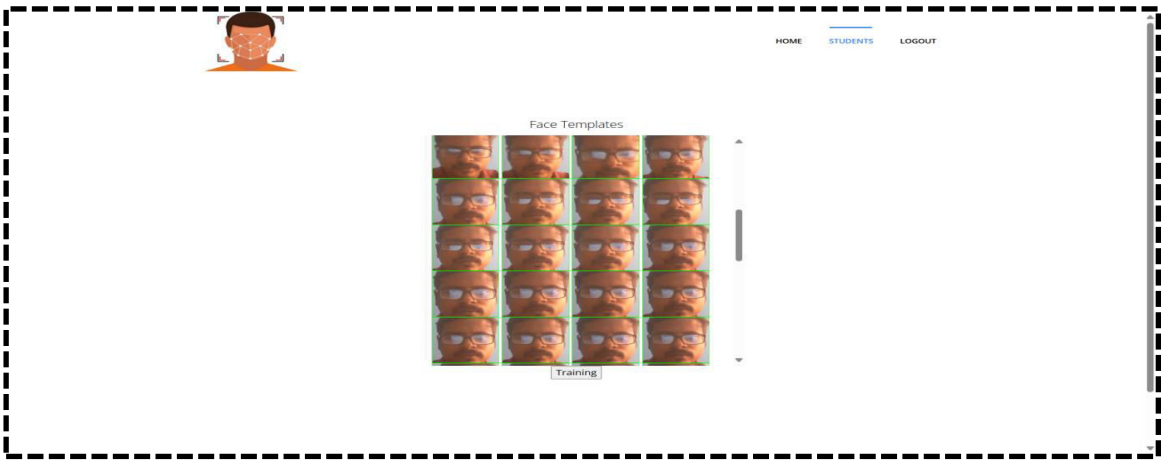

Fig 12: Face Templates Training

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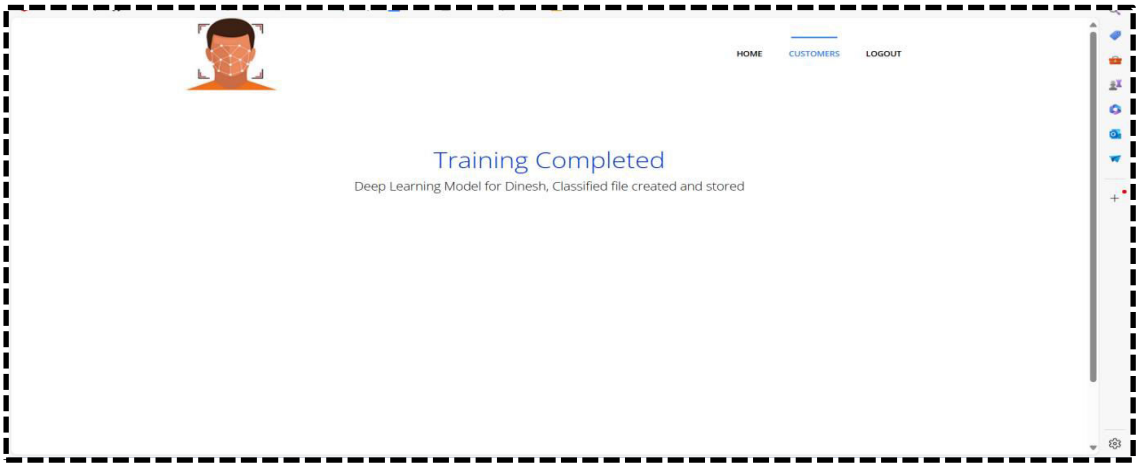

Fig 13: Training Completed Page

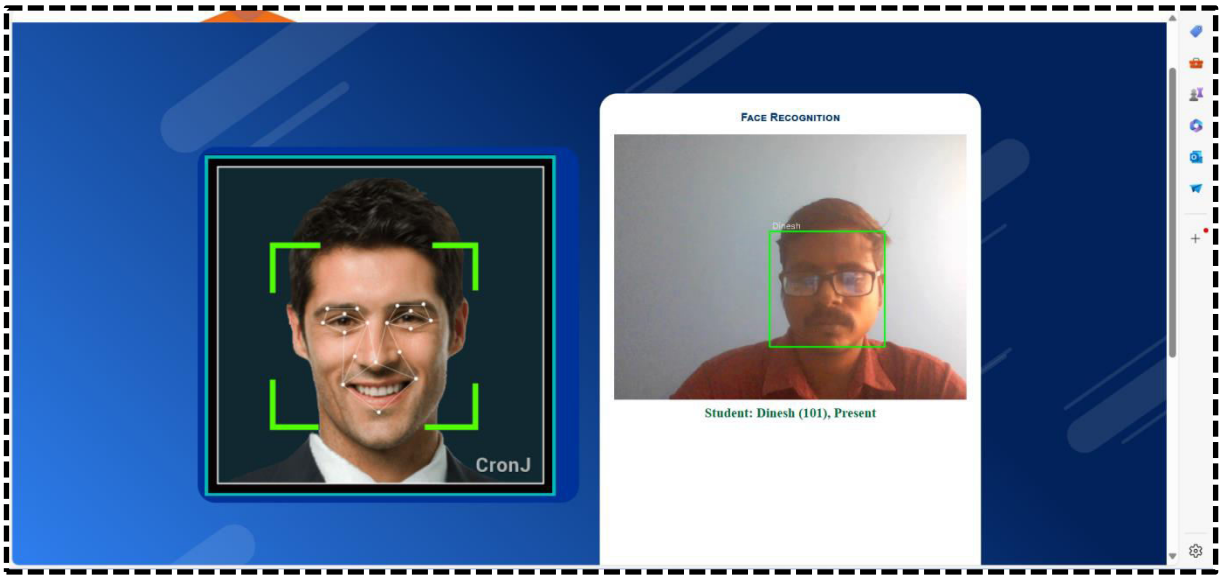

Fig 14: Face Recognition

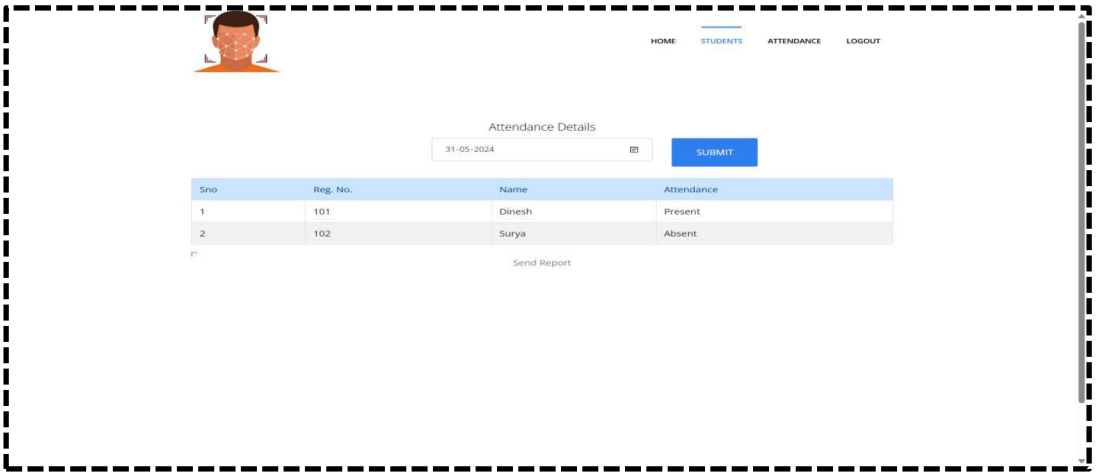

Fig 15: Student Attendance Details

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OUTCOMES: System testing and implementation are crucial phases in the development lifecycle of the automatic attendance system using facial recognition technology. These stages ensure that the system functions as intended and is ready for deployment. System testing involves evaluating the system's functionality and performance, while implementation focuses on deploying the system into production. Based on the test results, the Automatic Attendance System meets the specified requirements and demonstrates reliability, accuracy, and efficiency in automating attendance management in educational institutions. However, continuous monitoring and periodic updates are recommended to address any emerging issues and further enhance system performance and security. Overall, the system is ready for deployment and use in real-world educational settings.

V. CONCLUSION

College attendance and student monitoring system during class hours has become one of the hot issues in the society, so the management of college students should be strengthened. However, most college students still use traditional manual attendance for daily attendance, using paper signatures or teacher orders, but now with the gradual rise of technology, some new methods point out that gradually, a few colleges and universities will use punch card fingerprints and smart attendance methods. Although there are some ways to stimulate attendance, the effect is not so effective. This project proposes an algorithm for face detection and recognition based on Convolution Neural Networks (CNN), that outperforms the traditional techniques. Automatic attendance system has been anticipated for the purpose of minimizing the human errors which take place in the conventional attendance taking system to validate the efficiency of the proposed algorithm. The basic aim is to automate the system and implement the smart class room which is useful for educational organizations. Faster Region Convolution Neural Network along with the Edge Computing techniques are utilized to achieve the state–of–the–art results. In this project, a face recognition attendance system based on real-time video processing is designed with Faster Region Convolutional Neural Network. The attendance system realizes the expected attendance results through face recognition technology with the help of a computer, which fully reflects the feasibility design of the overall algorithm. The system has made tremendous innovations, greatly improving the attendance rate and the reliability of face recognition technology.

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