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Automated Attendance System Using Facial Recognition

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AGENDA

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References

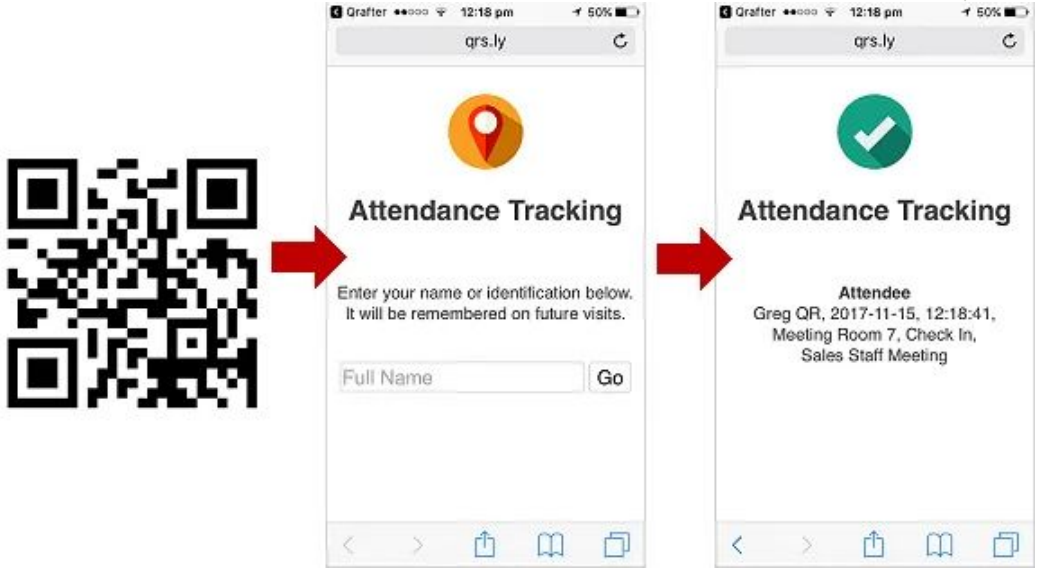

ter
arlotte
mma
Hailey
Hunter
Isabella


KAUSHIK
KULDEEP
MANOJ
MURALI
MANDEEP
NAITYA
PUSHPAMI
RAMA CHANDRA
SATISH
SRAVANI
SAI
SRI DEVI
SHANK SUNDAR
STEFANI

LITERATURE REVIEW

[1] Smart Attendance System using QR code

The proposed system here, generates a smart attendance system which uses Quick Response (QR) code to track & record the attendance. Students and professors are given a unique QR code, at the beginning of the course, they are required to scan their QR code using a QR reading device. Attendance of students whose QR code is scanned will be recorded. This system is responsive to mobile phones and different computer systems.



[2] Face Recognition Attendance System Based on Real-Time Video Processing

Here they considered accuracy rate, stability of system in actual time video processing, truancy of system and interface setting of the face recognition system.

Face detection and recognition are two main parts of face recognition.

Feature extraction is done by the LDA (Linear Discriminant Analysis) method. This model takes help of methods such as geometric Feature method, Subspace analysis method, Neural Network methods, Support Vector Machine (SVM) method to develop their face recognition algorithm.

Experimentally this model of video face recognition system gives an accuracy rate up to 82%.

[3] Face Recognition System Based on LBPH Algorithm

Abhishek Pratap Singh et al. proposed a face recognition system using Local Binary Patterns Histogram algorithm and Haar Cascade classifier.

LBPH was used for identifying a face and also it recognized both front and side faces irrespective of picture quality, with better recognition rate in real time.

The system was able to recognize a known and unknown person.

When the rate of change in the frame was very high, occlusions occurred and the proposed method was not able to robustly recognize the faces.

[4] Automatic Attendance System using Face Recognition

In this work, facial recognition is applied into an attendance checking system that uses faces of registered people to check their attendance.

This system has a GUI, which allows user-to-system interaction and attendance marking will be easy through recognizing the face of the student with the help of the recognition algorithm and mark the attendance.

Cascade classifier is using to detect face.

The Local Binary Pattern Histogram algorithms for this technology using face recognition, to monitor students and they can verify their attendance status with the help of the Register Number.

[5] Automatic Face Detection and Recognition for Attendance Maintenance

This paper focuses on building a deep learning based attendance capturing system.

They developed a system architectural solution using YOLO(You Look Only Once) embeddings by applying multiple augmentations, picture quality check and denoise methods to get a better attendance system.

Their proposed solution uses a Deep Learning approach that involves reading data from live-video from a camera installed in the classroom, converting them to necessary frames, perform face detection using YOLOv3 on these frames and apply face recognition with Linear Support Vector machine classifier(SVC) on detected faces and mark the attendance.

During testing, their system was detecting non-facial images and face reflections as actual faces.

[6] Face Recognition for Attendance System Detection

Rudy and Marcus developed a face recognition system that consists of four stage processes. The processes were face detection process using Haar Cascade Algorithm and skin color detection where images were converted from RGB format to YCrCb format, alignment process that applied face features normalisation, feature extraction process, and classification process using LBPH algorithm.

The face recognition accuracy was 98.2% at a face distance 40 cm from the camera with lighting condition of 24 lux and for lighting condition of 7 lux accuracy was 94.7%.

Testing was performed for camera distance between 40cm-90cm, accuracy decreased for farther distance face recognition.

[7] Automatic Attendance System using Deep Learning

Sunil Aryal et al. proposed an attendance system with combination of facial recognition algorithm and machine learning algorithm.

Single Shot Multibox Detect (SSD) was used for face detection from an image capturing in real time and recognizing the detected face using pre trained FaceNet Model, which are optimized based upon triplet loss.

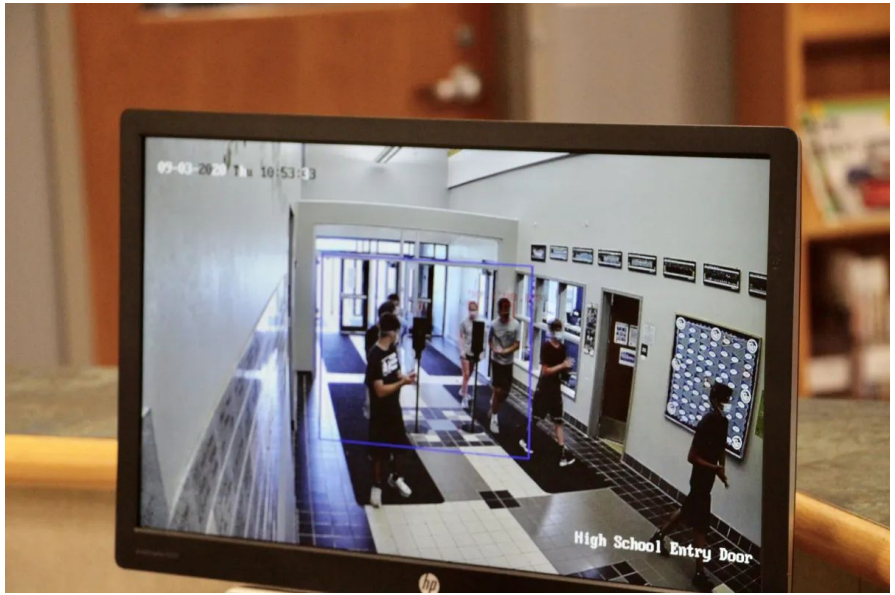
From the experiment analysis, the accuracy obtained of the proposed system was 97%.

The approach solved the problems of face recognition but cannot identify each and every student present in a class.

[8] Automatic Attendance System using Deep Learning

An automatic attendance management system was proposed using face recognition algorithms.

A camera at the doorway captures student's image while entering into the class. But, that system faced limitations as it could not define two persons at the same time.



[9] Automatic Attendance System using Deep Learning

In this proposed solution, two database (face database and attendance database) are used.

During enrolment, facial images of students are stored into the face database.

The camera captures the images of the classroom, the images get enhances and the attendance is marked in the attendance database after face detection and recognition. AdaBoost algorithm and Principal Component Analysis (PCA) are used for face detection and face recognition respectively.

[10] IAAS: IoT-Based Automatic Attendance System with Photo Face Recognition in Smart Campus

This paper proposes an IoT-based Automatic Attendance System (IAAS) which is an attendance checking system using a face recognition technology.

The image data of students are collected by a capturing device, for example a smartphone and tablet PC, and then processed by the face recognition system.

This system checks who are attending the class and send their attendance to an attendance database system through an email notification.

For face detection, MTCNN with ESRGAN is used, ESRGAN is a technique to increase the image resolution along with Haar-Cascade to extract user's face data.

To construct a notification service, an email protocol that is Simple Mail Transfer Protocol is used. Message Queuing Telemetry Transport(MQTT) for IoT Message exchange is used.

[11] Going deeper with convolutions

A GoogleNet technique is used to make a Face Verification model.

Szegedy et al. proposed a GoogleNet, which is a deep convolutional neural network architecture named Inception.

The main advantage of this method is a significant quality gain at a modest increase in computational requirements when its neural network is compared to shallower and less wide networks.

In addition, the data are trained using vggface2 data set. However, vggface2 provides a huge amount of data, but because it is a picture of Westerners, it has the disadvantage of poor learning efficiency in Asians.

Identified Gaps

- Lack of efficiency
- Lack of robust and error free systems
- Lack of efficiency and accuracy of previous existing algorithms
- Proxies
- Cost
- Fail to recognize faces when illuminated, rotated, pose, occlusions etc.
- Detection process is slow, and computation is complex in terms of neural networks
- Long training time
- Large database is required to achieve high accuracy

Solution

DATABASE CREATION

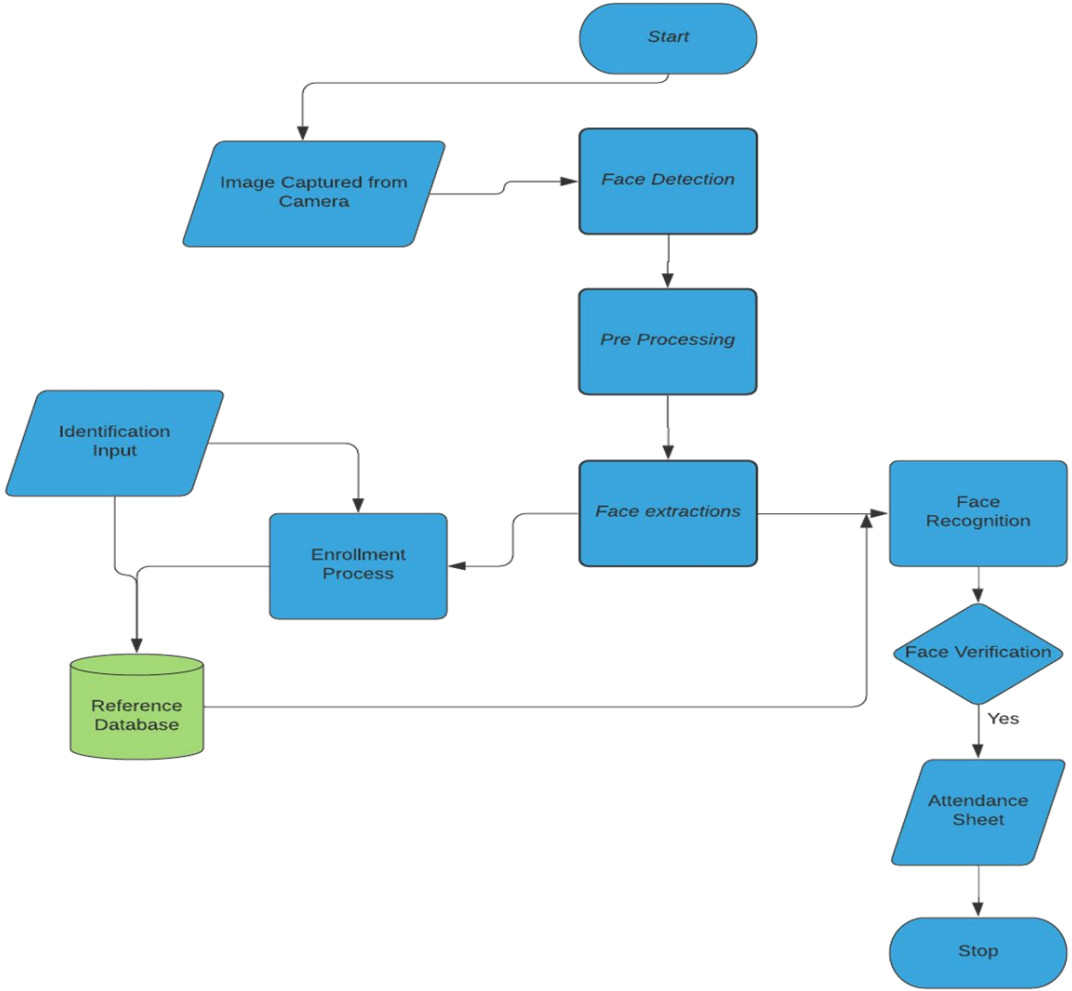
CAPTURE

EXTRACTION

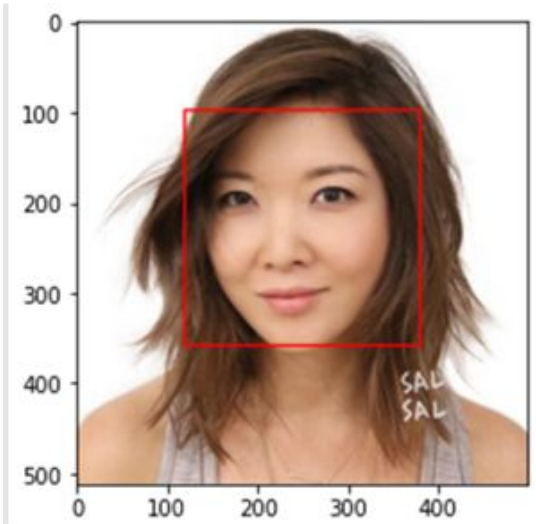
COMPARISON

MATCHING

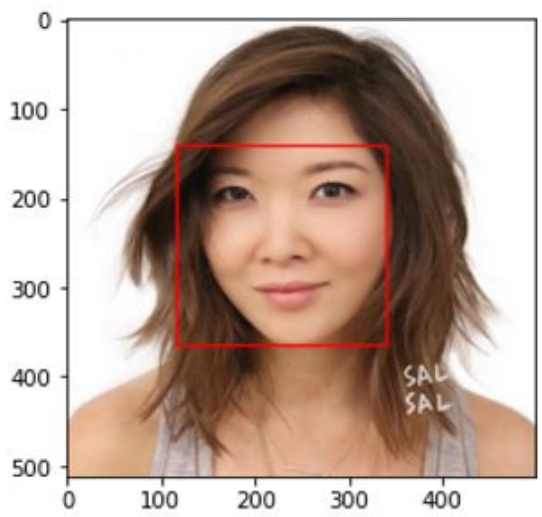
MARKING


Start
Image Captured from Camera
Face Detection
Pre Processing
Identification Input
Face extractions
Face Recognition
Enrollment Process
Face Verification
Reference Database
Yes
Attendance Sheet
Stop

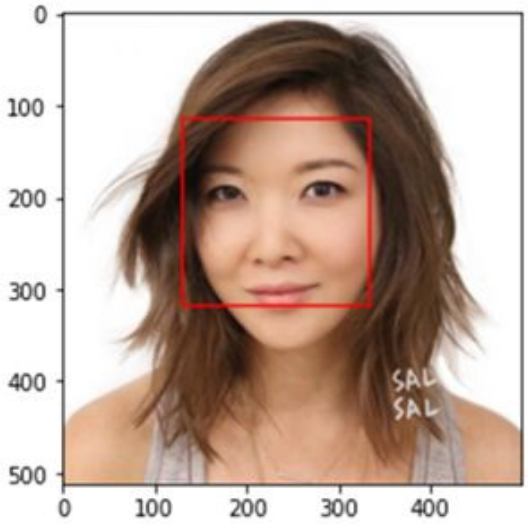
HAAR CASCADE



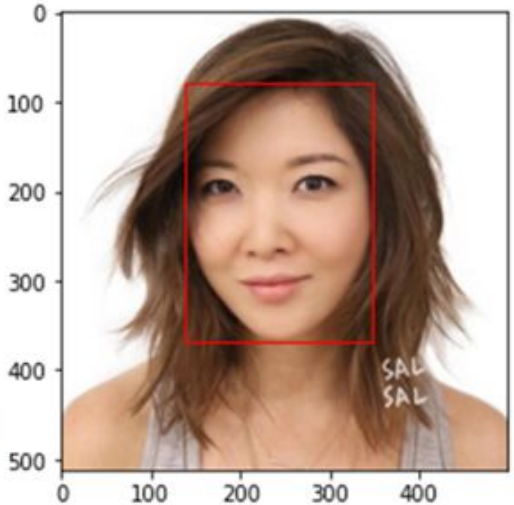
DLIB CNN

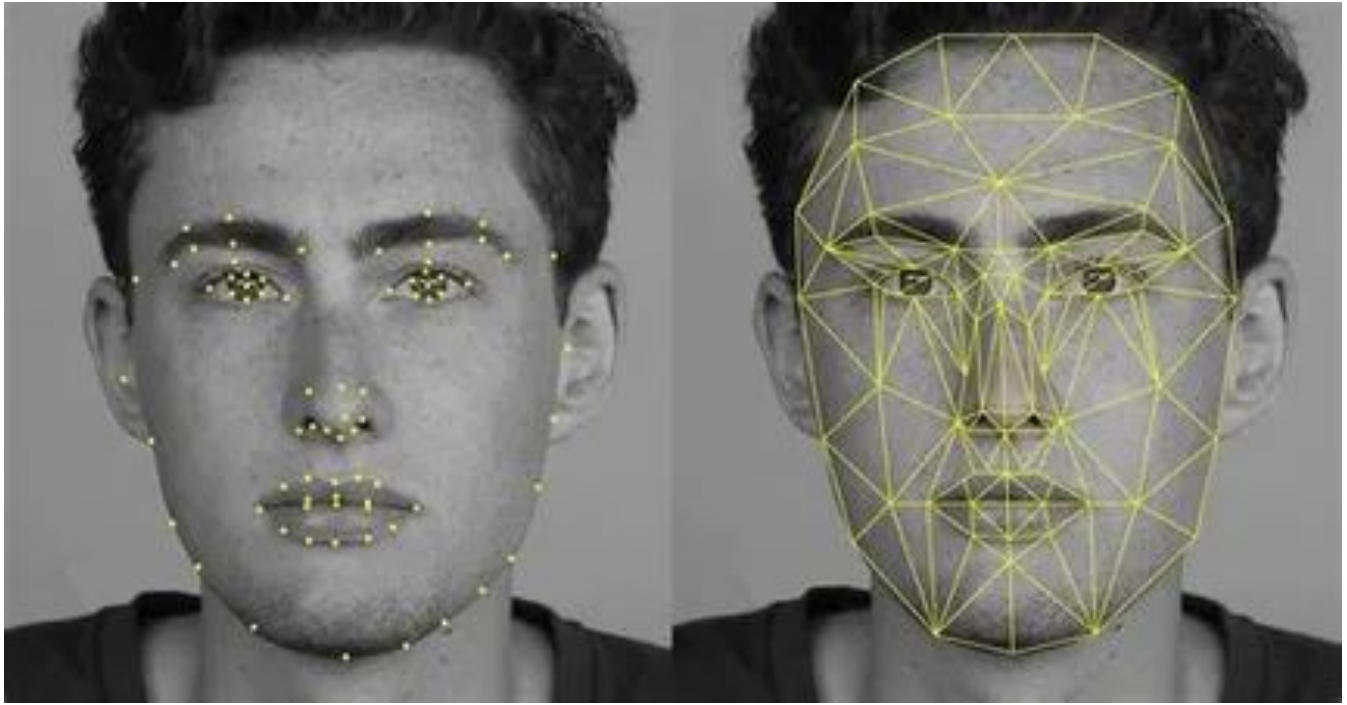


DLIB HOG



MTCNN





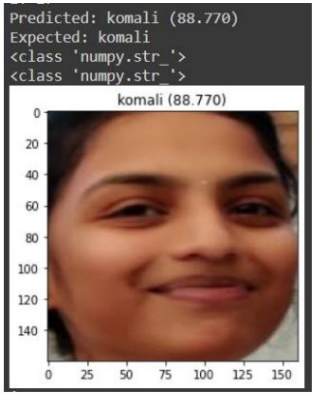
Face Embeddings

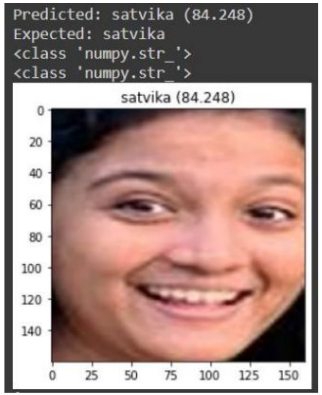
FACE DETECTION

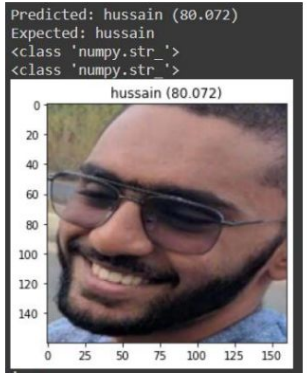
```
def extract_face(filename, required_size=(160, 160)):
  image = Image.open(filename)
  image = image.convert('RGB')
  pixels = asarray(image)
  detector = MTCNN()
  results = detector.detect_faces(pixels)
  x1, y1, width, height = results[0]['box']
  x1, y1 = abs(x1), abs(y1)
  x2, y2 = x1 + width, y1 + height
  face = pixels[y1:y2, x1:x2]
  image = Image.fromarray(face)
  image = image.resize(required_size)
  face_array = asarray(image)
  return face_array
```

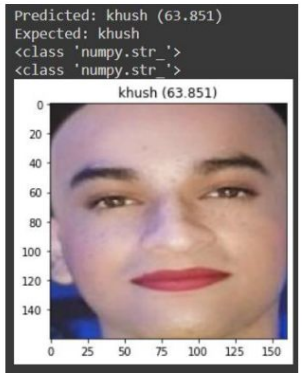
FACE CLASSIFICATION

Successful Cases

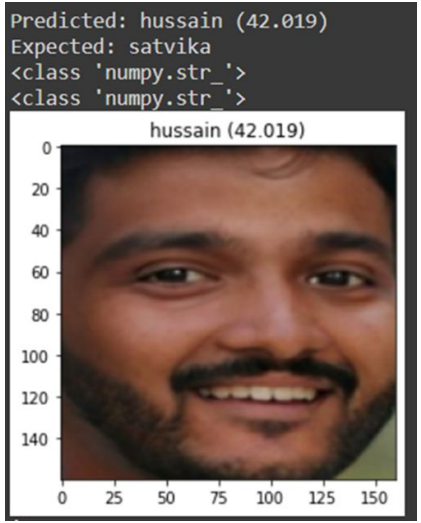


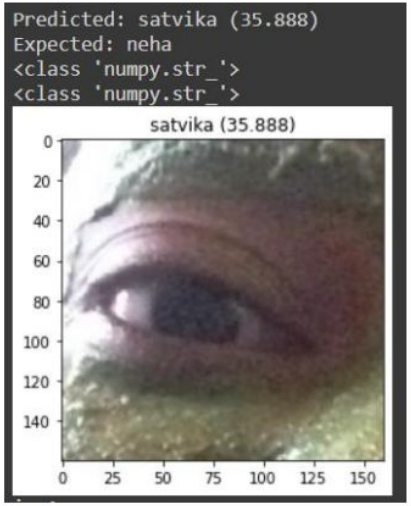




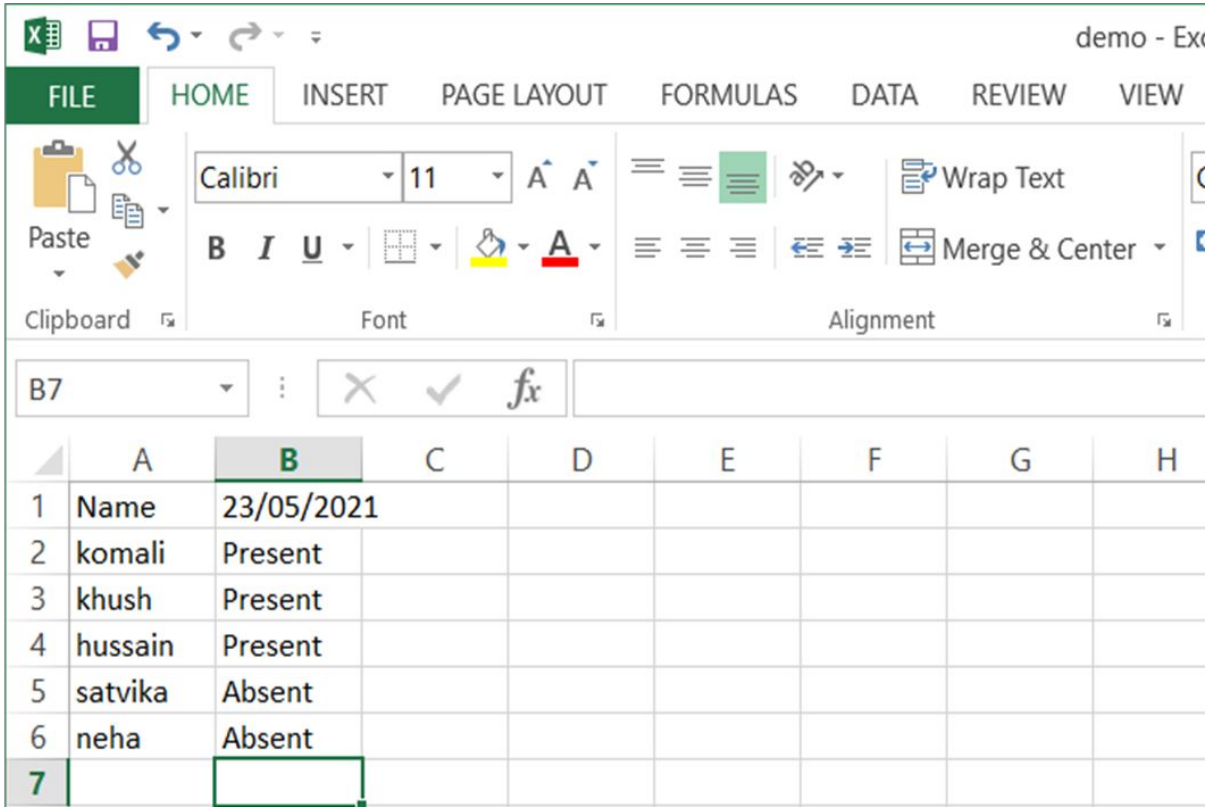


Unsuccessful Cases





ATTENDANCE MARKING



CONCLUSION

Future Work

- Deploy into a web application
- Use cloud-based face recognition
- To detect identical twins
- To check on faces that went through surgery
- Integrate into ERP website by using CBIT's real-time data
- Image quality check and denoise methods to get a better attendance system with less maintenance, low cost hardware
- Smart Attendance System based on real-time video processing
    - The Actual Sign-in Accuracy Rate
    - Stability Analysis
    - Analysis of The Skipping Rate
    - Interface Settings

References

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THANK YOU