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ENSURING EDUCATION FOR POST COVID USING DEEP LEARNING

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Abstract - *A deep learning based study was used to reduce the COVID effect on education system. Corona virus was identified in 2019 and posed a great challenge to the world since its outbreak. despite of the comment on end of COVID or end of mask wearing era still a report says that there are new 15,000 fresh cases of COVID from January 2024. Even a scientist molly smith stated on wearing mask in 2024 that at certain situation coronavirus epidemics have forced people to wear masks to counteract the transmission of virus, which also brings difficulties to monitor large groups of people wearing masks. In this paper, we primarily focus on the AI techniques of masked facial detection and related datasets by using CNN based deep learning algorithm. The purpose of the proposed system is to protect the students and staff against infectious diseases and increase the student performance during classes by monitoring their facial movements and alert them during drowsy times. The paper also works on detecting the use of masks in closed areas like classroom by training a customized deep learning model which also monitors the student's attendance data just by recognizing their face through a deep learning model.*

Key Words: *convolutional neural network, automatic attendance, deep learning, masked face , drowsiness alert.*

1.INTRODUCTION

After the attack of COVID a lot has changed in the society especially a diverse effect where caused in the education sector. When the situation turns normal, where a one to one classes started again the students and staffs were insisted to wear face masks and later on which become a mandatory one. Hence in our project a 3 stages of initial test were proposed to examine the student's state and further a smart attendance could also be done by storing and reporting the student data by facial recognition. Also the student's facial and eye movements were tracked during the class hours to monitor their attentiveness. It is also designed to alert them in case of remissness.

Initially the face of the student is analyzed and features are extracted to create a ROI. Next, the student's face is differentiated from the mask by using a system, which is already trained using the datasets uploaded. After the advent of COVID, there were many datasets developed to work on the project. Further using facial recognition technology, the system can accurately identify individuals based on their unique facial features, eliminating the need for manual attendance taking methods which could also vastly reduce the problem with proxy attendance.

The libraries like shutil and pickle could be used to manage the data of the student in the backend of the system. Already enrolled student's data along with their unique id were refurbished based on their daily attendance. In case of new students, the student is asked to show their face in the camera to train the system freshly. Also the student's attentiveness in the classroom is monitored by tracking their eye movements, which could improvise the productivity of education.

2. EXISTING SYSTEM

The existing system is the first survey about masked face detection dataset. It works on numerous datasets like around 13 Datasets and compare those methods to ensure the best out of them. Initially they are using two categories of methods.

(i) Conventional method.

(ii) Neural network method.

The conventional method usually works on hand crafted features, which accounts for a small proportion and the neural network based method are further classified as three parts according to processing stages.

They have also incorporated ACS (Advanced Card Systems) card reader to register the unknown students to the system. Additionally, an MQTT (Message Querying Telemetry Transport) broker that is run on the device establishes the data transmission.

2.1 Disadvantages of existing system

- Here some methods are used to detect only masked and un masked faces and no other advanced features
- Some datasets are created by stimulating masks which could not give better result
- Lacking of the model size

3. PROPOSED SYSTEM

The proposed system extends the existing system by using the high precise datasets to recognize the masked and unmasked faces in education sector. The same could be used for attendance tracking purpose as well. Initially a COVID prediction website is opened to check the health condition of the student. Subsequently, the COVID negative students are allowed to show their face on *a camera to detect the mask. In case of mask recognition. they are allowed inside the classroom else a* restriction message will be passed. The face mask detection is also achieved with higher accuracy than the existing system using CNN model.

Further, the attendance of the student is updated based on the facial recognition using shutil (Shell Utilities module) algorithm that will perform high level operations with automation and a report will be generated on their identity. Finally, an alert system is incorporated into the model to observe the students during the class hours.

3.1 Advantages of proposed system

- Absolute protection against COVID and air borne diseases.
- Reduce the burden on manual attendance maintenance and reduce proxies.
- The student's attentiveness could be gradually increased by monitoring them during the class hours.

4. ALGORITHM USED: (CNN ALGORITHM)

Input:
Face of the student along with unique ID.
Output:
Facial recognition and updation of the attendance.

[1] ImageDataGenerator =1/255, rotation _range = 20, horizontal _flip=True.

[2] model.add(conv2D(filter,kernel_size, padding), model.dense(activation)

[3] startX, startY =max(0,startX), max(0, startY)
endX, endY = (min(w-1, endX), min(h-1, endY))

[4] detect_and_predict_mask (frame ,face Net , mask Net)

[5] cv2.face. LBPHFace Recognizer .create()

[6] def eye aspect ratio(eye):
A = dist.euclidean(eye[1], eye[5])
B = dist.euclidean(eye[2], eye[4])
C = dist.euclidean(eye[0], eye[3])
Ear = (A + B)/ (2 * C)

4.1. Algorithm Description

The convolutional neural network is used which is a type of artificial neural network used primarily for image recognition and processing due to facility of recognizing the pattern in images.

Step 1: After getting the input, the data are trained using the image data generator method which could zoom , flip horizontally or vertically to train our system to predict the face.

Step 2: According to our algorithm, we have 3 hidden layers and 2 dense layers which is shown using the model. add and model. dense method.

Step 3: The co-ordinates to determine the ROI of the respective region is generated as X and Y.

Step 4: A frame is detected and using that the faces are detected and determine if they are wearing a face mask or not.

Step 5: In case of new students and real time detection the system is trained to extract the features from the newly captured student's image. Finally a report will be created using the central database.

Step 6: The eye aspect ratio (EAR) of the student t is extracted to detect the attentiveness of the student during the class hours.

5. WORKING PROCESS

- Download and install Anaconda and get the most useful package for machine learning in Python.
- Load a dataset and understand its structure using statistical summaries and data visualization.
- Train the system using the algorithm with many datasets that have collected.
- Once the system gain knowledge on recognizing and differentiating between the images, we could start inserting our own data.

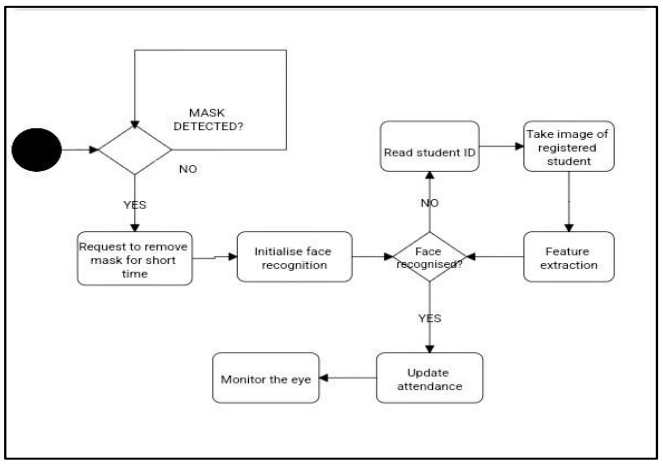

FIGURE 1. Working process

1. Mask Detection
To allow the students to attend the class we have to detect whether the student wears the mask or not. This is done to prevent the students from spread of air borne diseases.
2. Face Recognition
This will check whether the recognized face is already been in memory. If not, it starts to extract the features from the new student. It also reads the student id for storing their data with unique reference.
3. Monitoring the Eye
In this the eye movement of the student is checked and if the student's feel drowsy or unmindful in the classes, an alert will be produced to regain concentration of the student.

6. RESULTS AND DISCUSSIONS

As a result a better education environment is adopted to ensure the education continuity after COVID . Literally, better accuracy on facial detection and automated attendance system as compared to the existing system is achieved. Additionally, a system to monitor the students during the class hours is developed which could improve the education which is not focused in the existing work.

6.1 IMPLEMENTATION

Initially, the student's health condition was checked using a website that was created to predict the symptoms of COVID, based on the parameters collected from them.

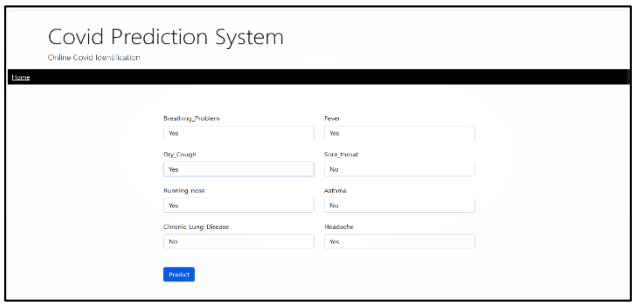

FIG – COVID prediction website

If the parameters did not match then the students were allowed enter the mask detection test.

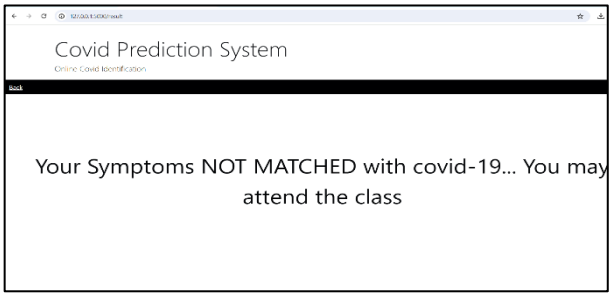

FIG- Unmatched symptoms

Next, the mask detection was performed. Our system shows the 100% result on detecting the presence or absence of mask.

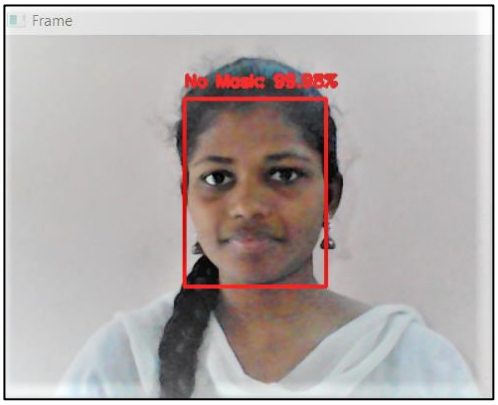

FIG- No mask was detected

When mask was detected, a message will be passed to allow the student to enter into the class.

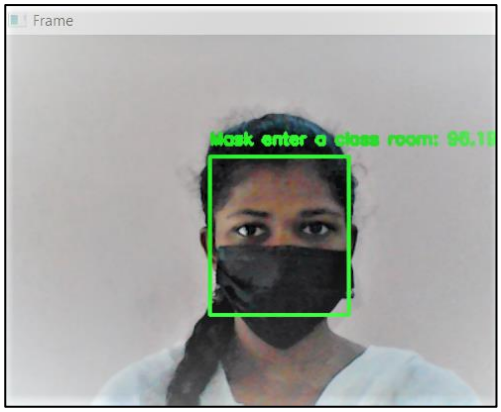

FIG – Mask was detected

Once the mask was detected, the attendance system page will be opened. By showing the student's face, the system could predict their id and update it on the attendance list.

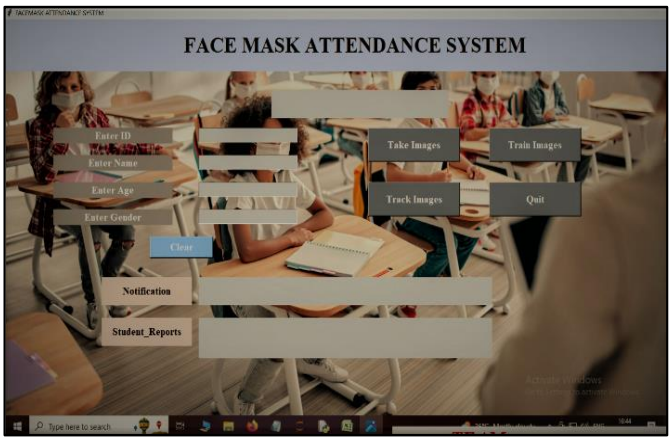

FIG - Face mask attendance system

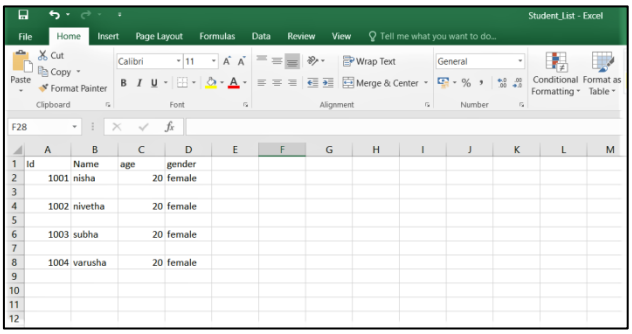

FIG – Attendance database

Additionally, the student's facial movement is also analyzed to predict their attentiveness during the class. Once the blink exceeds continuous 10 counts within the time interval of 5secs, then an alert will be produced.

FIG – Eye features are extracted.

Alert will also be produced also when the duration of eye closure exceeds certain time limit..

FIG – Drowsiness alert was started

7. CONCLUSION

In conclusion, the facial mask detection project has successfully achieved its objectives of developing a robust system capable of accurately identifying whether individuals are wearing masks in real-time. Through the utilization of deep learning techniques such as convolutional neural networks (CNNs) and image processing algorithms, we have created a model that demonstrates high accuracy and efficiency in detecting facial masks.

The facial attendance system represents a cutting-edge solution for attendance tracking, offering numerous advantages in terms of accuracy, efficiency, and security. Also, a productive environment is also assured by our model. By harnessing the power of facial recognition technology, we have developed a system that not only meets the current needs of organizations but also lays the groundwork for future advancements in workforce management and surveillance technologies. Also, a productive environment is also assured by our model.

8. FUTURE ENHANCEMENT

1. In future heart & respiration based rate monitoring, and fever measurement features to the proposed system could be integrated.
2. A complete solution will be developed to monitor and occur in the future.
3. Eventually, an alert and notification system could also be developed based on the student's irregular attendance or unexcused absence.

9. REFERENCES

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