



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 7, July 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com

Face Mask & Body Temperature Scanning Entry Barrier for Covid-19 Using Machine Learning

A. Hameed Ansari¹, Abhijeet Sasane², Digambar Pagare³, Ganesh Sasane⁴

Professor, Dept. of Electronics and Telecommunication Engineering, PREC, Loni, India ¹,

Students, Dept. of Electronics and Telecommunication Engineering, PREC, Loni, India ^{2,3,4}

ABSTRACT: COVID 19 pandemic is causing a global health epidemic. Globally, as of December 2021, there have been 90,054,813 confirmed cases of COVID-19, including 1,945,610 deaths, reported to WHO. The COVID-19 virus can spread by direct contact (infected people) or indirect contact (contaminated environment). The safety tool to avoid the transmission is wearing a face mask. According to WHO, wearing a face mask at public places reduces the risk of transmission. In this paper, an IoT-enabled entry barrier that uses a machine learning model to detect face mask and body temperature. The proposed model can be implemented at entrance of public places such as schools, colleges, workplaces, shopping mall, etc. As an outcome it is a cost-effective and reliable method of using computer vision and sensors to build a healthy environment. This proposed system can detect the face mask as a preventive measure COVID 19 and body temperature contactlessly.

KEYWORDS: Face Mask Detection; Temperature Detection; Machine Learning; Raspberry Pi; Sensors;

I. INTRODUCTION

The coronavirus disease, or COVID-19, which originated primarily in Wuhan, China, has rapidly spread to several countries, including India. India would have trouble preventing the spread of the coronavirus.

The idea to avoid the COVID 19 transmission is by enabling a secure environment. This can be done by following COVID 19 guidelines. Face masks are the most effective way to minimize transmission. Also, individuals with high body temperature are not to be permitted to enter public places because they are at a high risk of infection.

Machine learning and computer vision represent an interesting method for adaptive image processing. That enables an entry barrier to automatically detect a face mask and monitors human body temperature contactlessly.

II. LITERATURE REVIEW AND OBJECTIVE

2.1 Literature Review

Megha Warungase, Prof. S.G. Chordiya developed 'Face Mask and Body Temperature Detection System to Prevent COVID for Work Environment.' In this paper successfully they constructed a face mask detection system to detect and capture the temperature of a specific point inside a predicted bounding box, they created a COVID-19 face mask detector using OpenCV, python, and Deep Learning. [1]

Sundar Kharvi, Preshit Churi developed 'Covid-19 Temperature Monitoring System'. This paper focuses on monitoring the temperature of person using MLX90614 is IR Digital sensor in real time. That can be used to measure temperature of object range from -70°C to 382.20°C. from distance upto 15cm precisely. [2]

BVarshini, Archana Sasi developed 'IoT-Enabled smart doors for monitoring body temperature and face mask detection'. This paper investigates the basic theory and implementation of CNN algorithm. The researchers introduced a high accuracy strategy for detecting facial masks based on fully convolutional networks, gradient descent, and binomial cross-entropy by using semantic segmentation. The use of CNN to improve the accuracy and speed. [3]

2.2 Objectives

- To implement an automation system to detect face mask and body temperature to reduce the effect of COVID-19 and save the human beings.
- To detect COVID-19 symptoms by measuring body temperature and precaution by detecting the face mask.

III. METHODS AND BLOCK DIAGRAMS

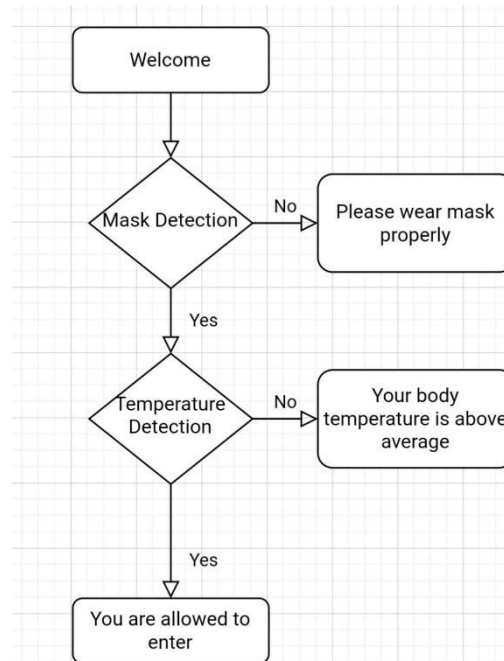


Figure 1: Flow Chart of proposed system

3.1.Face Detection

Face detection applications use algorithms and ML to find human faces within larger images, which often incorporate other non-face objects such as landscapes, buildings and other human body parts like feet or hands. Face detection algorithms typically start by searching for human eyes -- one of the easiest features to detect. The algorithm might then attempt to detect eyebrows, the mouth, nose, nostrils and the iris. Once the algorithm concludes that it has found a facial region, it applies additional tests to confirm that it has, in fact, detected a face.

3.2 Face Mask Detection

Step 1: Data Visualization

In the first step, let us visualize the total number of images in our dataset in both categories i.e. with face mask and no face mask.

Step 2: Data Augmentation

In the next step, we augment our dataset to include a greater number of images for our training. In this step of data augmentation, we rotate and flip each of the images in our dataset.

Step 3: Splitting the data

In this step, we split our data into the training set which will contain the images on which the CNN model will be trained and the test set with the images on which our model will be tested.

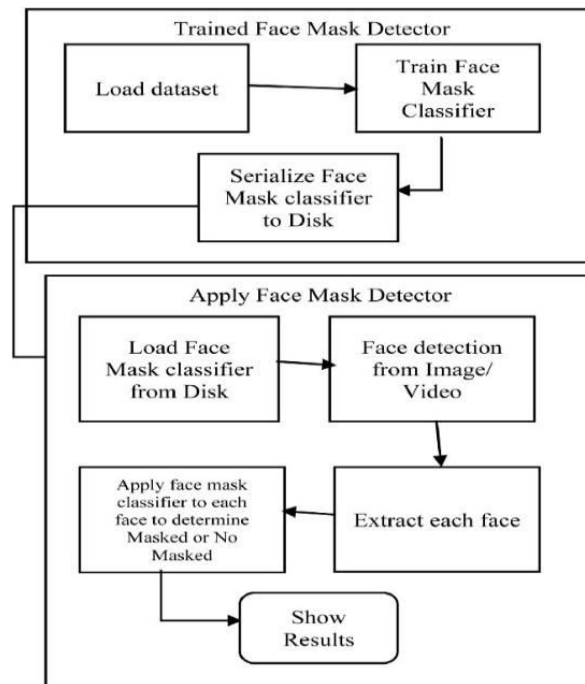


Figure 2: Face Mask Detection Algorithm

Step 4: Building the Model

In the next step, we build our Sequential CNN model with various layers such as Conv2D, MaxPooling2D, Flatten, Dropout and Dense. In the last Dense layer, we use the 'softmax' function to output a vector that gives the probability of each of the two classes.

Step 5: Pre-Training the CNN model

After building our model, let us create the 'train_generator' and 'validation_generator' to fit them to our model in the next step.

Step 6: Training the CNN model

This step is the main step where we fit our images in the training set and the test set to our Sequential model we built using keras library.

Step 7: Labeling the Information

After building the model, we label two probabilities for our results. ['0' as 'without_mask' and '1' as 'with_mask'].

Step 8: Detecting the Faces with and without Masks

In the last step, we use the OpenCV library to run an infinite loop to use our Raspberry Pi camera in which we detect the face using the Cascade Classifier. The code 'webcam = cv2.VideoCapture(0)' denotes the usage of webcam.

The model will predict the possibility of each of the two classes ([without_mask, with_mask]).

3.3 Body Temperature Detection

The MLX90614 temperature sensor is connected to the GPIO pin which gives precise body temperature to Raspberry Pi.

IV. REQUIREMENT ANALYSIS

4.1 Hardware resource required

- Raspberry Pi 4 model B 4GB Ram
- Raspberry PiCam 8MP
- xCluma MLX90614 Contactless Temperature Sensor

4.2 Software resource required

- Technology: Python 3.7 – Tensorflow, OpenCV, etc.

V. RESULTS AND DISCUSSION

Our model started with low training accuracy as expected due to vast number of classes but as the model trained itself, the accuracy started to increase. The training was carried out on a computer running the 64-bit Windows10 operating system and equipped with an Intel ® CoreTM i5-8265U CPU running at 1.60GHz and 8 GB of RAM. Python 3.7 is being used as the application development language. The model was developed and trained using Keras as the backend and the Tensor-flow platform. To generate mask detector model input dataset and fine-tune MobileNetV2 is accepted using the training python script. Implementation of face mask detection in Raspberry Pi can be done using the mask detector model.

Sr No	Condition 1:Mask Detected	Condition 2:Temperature Detected	Barrier Gate
1]	Yes	Yes	Open
2]	Yes	No	Close
3]	No	Yes	Close
4]	No	No	Close

TABLE 1: RESULTS

VI. CONCLUSIONS

Our system can precisely detect face mask and body temperature. Our model can achieve a good accuracy in the end with only Raspberry Pi processing. Face mask detection using Tensorflow, OpenCV and CNN using Keras. Body temperature detection using MLX90614 temperature sensor. In this Paper, we studied about Convolutional Neural Network (CNN) model. CNN preserves the relationship between pixels by learning image features using small squares of input data. CNN model is used for Image Recognition, Image Classification, Object Detection, etc.

VII. FUTURE SCOPE

In future work, we will propose a deep learning framework by using pre-trained deep learning models to monitor the physical interaction (social distancing) between individuals in a real-time environment as a precautionary step against the spread of the COVID-19. The CDC (Centers for Disease Control and Prevention) also states that anyone with a hearing impairment should consider a clear transparent face mask. Therefore, we will also focus on the detection and classification of transparent face mask type. According to the WHO guidelines, the sneezing and coughing are the major symptoms of COVID-19.

VIII. ACKNOWLEDGEMENTS

It gives us great pleasure in presenting the paper on “Face Mask & Body Temperature Scanning Entry Barrier For Covid-19 Using Machine Learning”. We would like to take this opportunity to thank our guide, Prof. A. H. Ansari,



Department of Electronics and Telecommunication Engineering Department, PREC, Loni for giving us all the help and guidance we needed. We aren't grateful to him for his kind support, and valuable suggestions were very helpful.

REFERENCES

- [1]. Megha Warungase etc all, "Face Mask and Body Temperature Detection System to Prevent COVID for Work Environment", IJARIE-ISSN(O) Vol-7 Issue-3, 2021.
- [2]. Sundar Kharvi etc all, "Covid-19 Temperature Monitoring System", IRJET Volume: 08 Issue: 05, May 2021.
- [3]. B Varshini etc all, "IoT-Enabled smart doors for monitoring body temperature and face mask detection", Global Transitions Proceedings, 12 August 2021.
- [4]. Sundar etc "Covid-19 Temperature Monitoring System", May 5 2021.
- [5]. Nenad Petrovic, Dorde Kocic etc all "IoT-based System for COVID-19 Indoor safety Monitoring". IcETRAN 2020, September 2020
- [6]. R. Girshick, etc all "Rich feature hierarchies for accurate object detection and semantic segmentation," Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 580-587, 2014.
- [7]. J. Redmon etc all "You only look once: Unified, real-time object detection," Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 779-788, 2016.
- [8]. D. T. Nguyen etc all, "Person recognition system based on a combination of body images from visible light and thermal cameras," Sensors, vol. 17, no. 3, pp. 605, 2017.
- [9]. K. He, X. Zhang etc all, "Deep residual learning for image recognition," Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 770-778, 2016.
- [10]. J. Redmon etc all, "You only look once: Unified, real-time object detection," Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 779-788, 2016.



INNO  SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN  INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details