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Face Mask Detection Alert System for Covid-19 By using Raspberry PI

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ABSTRACT

The information that we have received from different sources such as the World Health Organization, Government Health Ministries, and other sources we have found that COVID-19 has infected more than 194 million human beings and more than four million human beings have died globally, however now the cases are decreasing but it's not the end of the virus . The only effective measure to avoid the contamination of the virus is by wearing face mask properly. This studies makes use of deep learning strategies in distinguishing facial recognition and identify if the individual is wearing a facemask or not and body temperature of the individual in public places. The system develops a Raspberry Pi-primarily based totally real-time facemask detection that alarms and captures the facial picture if the individual detected isn't wearing a facemask and the body temperature is not normal. Thus, the above stated system will assist the society through saving time and additionally facilitates in contaminating the unfold of coronavirus. This may be carried out in public locations along with colleges, schools, offices, shopping malls, etc. to mointor human beings.

Keywords: Computer Vision, Deep Learning, Keras, Open CV, Python, Raspberry Pi, Tensor Flow

1. INTRODUCTION

COVID-19 corona virus pandemic has infected most of all on a worldwide scale. It has effected economic growth of many countries Yu, P. et al [1]. Corona virus 2019 (COVID-19) is an respiratory disease which is caused by severe acute respiratory syndrome corona virus 2 or SARSCoV2 Chavez S,et al[2].The virus is spread through close contact with the people in public places. Yadav S et al.[3].To combat with the transmission of the virus, there are certain protocols set through the World Health Organization (WHO) like wearing face masks compulsory , following social distancing and washing or sanitizing hands with disinfectants frequently. An architecture was developed by using deep learning on a dataset that contain images of the individual's face with or without mask. It prevents the spreading of virus by finding out the persons who is not wearing mask by monitoring using Closed circuit Television cameras (CCTV).If the individual spotted is not wearing mask then report to concerned authority Pattabiraman.V et al [4]. This research study uses automatic face mask detection and body temperature detection implemented using Raspberry Pi4 .The system has a usbcamera that that captures the images and with sensor the body temperature is detected. If follows the COVID protocols then it is allowed or else the person is not allowed it will send the alert message.

2. RELATED WORK

The most essential model during this COVID -19 pandemic is the facemask detection as this is this the only way to avoid contact with the virus. Thus manually monitoring people with facemask in crowded places is not easiest job. Deep Learning is composed of a large number of neural networks that use the multiple cores of a processor of a computer and video processing cards to deal with the neural network's neuron which is considered as a single node X. Fu etal[5]. Deep learning is used in many applications due to its popularity in medicine and agriculture. Its applications include the recognition, detection and recognition of human, animal and plant diseases, detection and classification of fruit images, and image collection robots such as facial recognition through the attendance system Howard et al[6]. An automated system for finding whether a person is wearing a facemask in public the model is built by fine tuning the pre trained deep learning models called inception V3 .Simulated Face Mask Dataset (SMFD) is used to train the dataset. Akshay et al[7].Nag et al[8]

designed a face recognition door access control based on IOT environment. Open CV is used to recognize faces of people .Few works were developed to detect individuals wearing a facemask or not[9][10].

3. PROPOSED SYSTEM

This paper explains a efficient system which detects whether a person have worn a mask or not, the proposed structure focuses on following task

A) FaceMask detection
B) Temperature Detection
C) Email alert with alert message and screenshot as a proof
D) Screenshots of all no mask instances are stored inside a storage device.

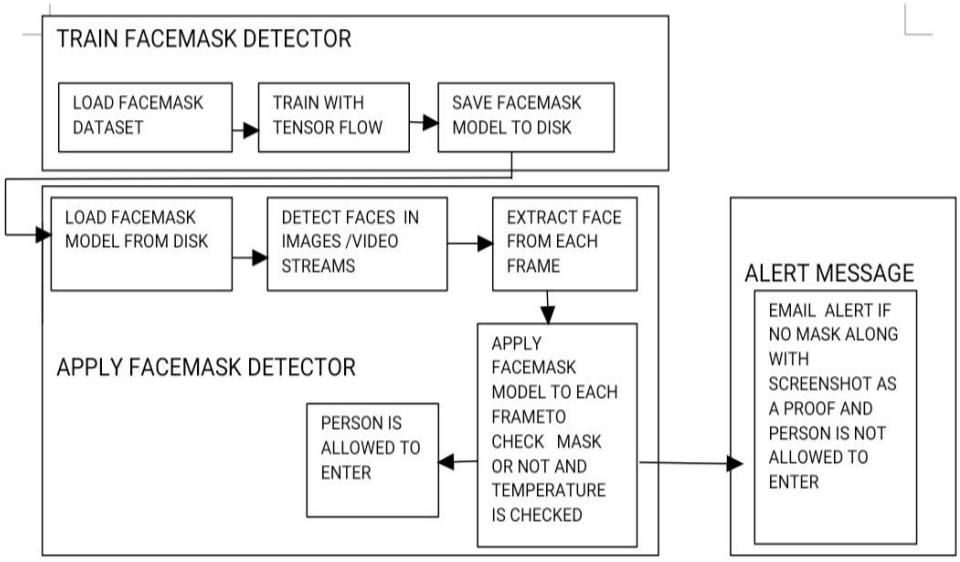

Fig 1. Working Flow For Our Proposed System

Facemask Detection

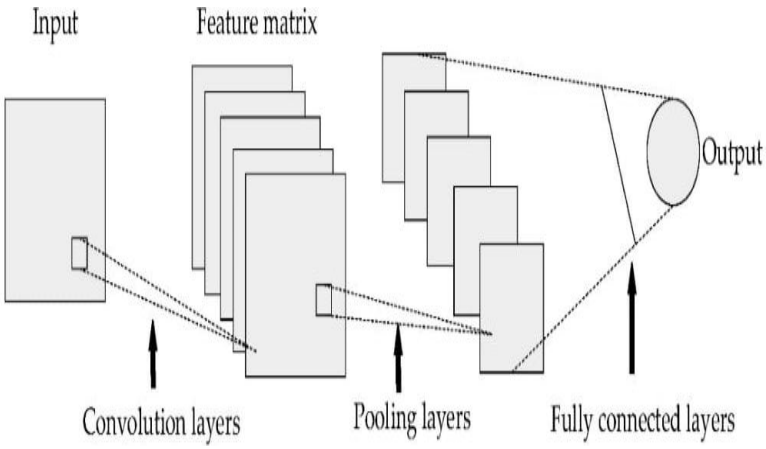

Fig 2. Basic Convolutional Neural Network.

The system will use various libraries such as Open CV, Keras, and Tensor Flow to help identify people wearing masks with the help of deep learning algorithms and computer vision. Images are downloaded from various open source websites and divided into mask and no mask. The size of the image and different resolutions are different

• Adjust the size of the input image (256 x 256)
• Apply color filtering (RGB) on channel
• Use the standard average of PyTorch's built-in weights to scale / normalize the cropped image from the center of the image, pixel value is 224x224x3

We train the model using tensor flow, that captures distinctive features from different categories of images. The distinctive features are saved in the form of graph. It is trained once and reused to classify the input image into the trained category. Subsequently, the training image is used for identity verification using the image classification algorithm.

Temperature Monitoring

The DSB1820 sensor is used to monitor the temperature . A temperature sensor detects temperature varying from -55 to 125°C. The sensor follows single wire protocol. It can communicate with the microcontroller through a single wire line. The temperature is monitored if it's optimum, the person is allowed and if it goes beyond threshold alarm will buzz for 5 times and the person will not be allowed to enter.

Email Alert

The persons with no mask are alerted by sending the e-mail along with screenshot as a proof . If the person still not wears the mask all the screenshot will be saved under the storage device.

4. RESULTS

The results that are obtained by our research study is shown below where we are interfacing Raspberry pi to various software tools such as open CV, tensorflow.

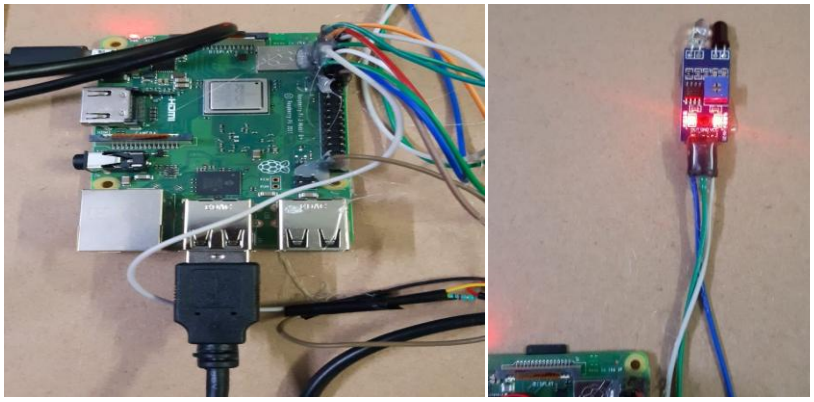

Fig 3(a) **Fig 3(b)**

Fig 3. Hardware Units

The person is identified, who have not wore the mask properly a RED square box is shown on the display to indicate no mask and GREEN square box to show the person with mask

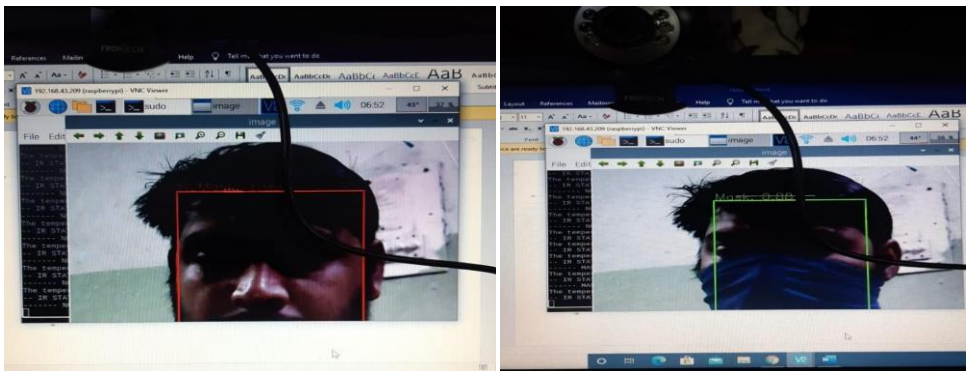

Fig 4. Face mask Detection

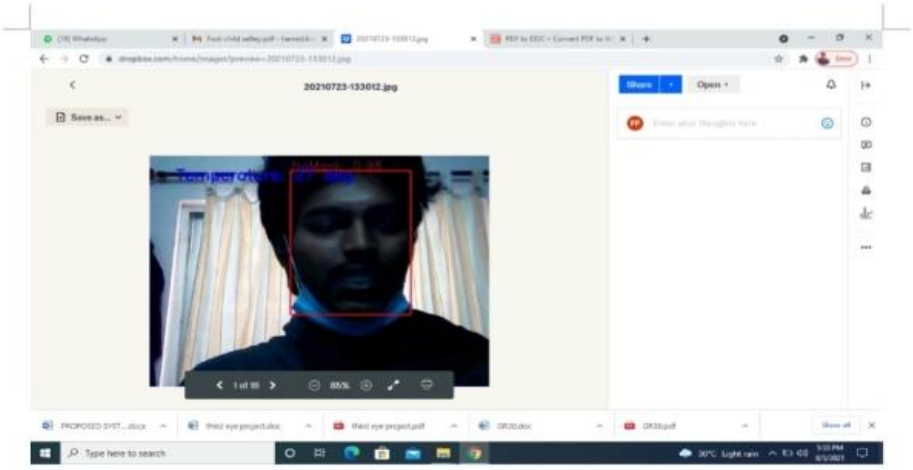

Fig 5. Email alert message

CONCLUSION

In our research study we have proposed a system that automatically identifies a person is wearing a facemask or not and monitors body temperature. The project can be implemented at crowded places such as schools, colleges, shopping malls etc. The system first detects whether the person is wearing a facemask or not and then the data is send to the microcontroller. The temperature sensor checks the person's body temperature and upon checking if it follows the covid protocols it opens the barrier arm and allows the person inside . With the help of this paper there is no need of the human to monitor.

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