International Journal of Engineering Innovations in Advanced Technology
ISSN: 2582-1431 (Online), Volume-4 Issue-2, June 2022

Detecting Covid-19 Suspects in CrowdUsing Face Mask Detection

B Jyothi
Assistant Professor, Department Of CSE, Anurag Group of Institutions, Hyderabad, India.
Email: bjyothicse@cvsr.ac.in

G Meena,G Pranathi,P Varsha
UG Scholar, Department Of CSE, Anurag Group of Institutions, Hyderabad, India.
Email: meenagajibanda29@gmail.com,pranathigundagani@gmail.com,pashamvarsha@gmail.com

Abstract **- The outbreak of COVID-19 corona virus in late 2019 has put a tremendous threat to the whole world. Driven by the mission to save lives, we develop a face recognition system to detect patients with fever symptom and to trace close contacts. A alert is sent to heard to enable further actions to quarantine the patients and close contacts. This provides a way to control the spread of the virus.Driven by the mission to save lives, we develop an edge-cloud based face recognition system to detect and trace COVID-19 patients with fever symptom.**

Index Terms- **COVID-19, Face recognition, Machine leaning, Real-time systems**

I INTRODUCTION

The outbreak of COVID-19 corona virus in late 2019 has put a tremendous threat to the whole world. As of end of September 28, 2020, more than 33 millions of cases, and nearly 1 million deaths have been confirmed . Therefore, it is very critical to stop the spreading of this virus before any vaccine becomes available. Unfortunately, the only effective approach is to cut off the transmission route by quarantining the patients and their close contacts.

Driven by the mission to save lives, we develop an edge-cloud based face recognition system to detect and trace COVID-19 patients with fever symptom, and their close contacts. We understand that not every patient of COVID-19 has fever symptom. But still, detection of patients with fever symptom can help the control of the virus spreading significantly. Public use of face masks has been common in China and other nations in the world since the beginning of the new coronavirus disease outbreak.

Manuscript received April 05, 2022; Revised May 05, 2022; AcceptedMay 19, 2022

We now know from recent studies that a significant portion of individuals with coronavirus lack symptoms (“asymptomatic”) and that even those who eventually develop symptoms (“pre-symptomatic”) can transmit the virus to others before showing symptoms, according to the advisory published by the Health Centre. “This means that the virus can spread between people interacting in close proximity — for example, speaking, coughing, orsneezing — even if those people are not exhibiting symptoms”. The recent information also gives trace of a new strain of corona virus, the mutant corona virus which, in which the virus has changed its structure and become mutant. The new strain is not even able to detect using the RT-PCR test we use now. So it is inevitable for the people of an overpopulated country like India to wear masks and let the work go on.

Nobody can keep an eye on every person coming in the work space is wearing a mask or not. So the need of Face mask detection arose. The model in this paper uses the Convolutional Neural Network. It is a deep neural network model used for analyzing any visual imagery. It takes the image data as input, captures all the data, and send to the layers of neurons.

It has a fully connected layer, which processes the final output that represents the prediction about the image. The Convolutional neural network model used here is the MobileNetV2 architecture. MobileNet model is a network model using depth wise separable convolution as its basic unit. Its depth wise separable convolution has two layers: depth wise convolution and point convolution. It is based on an inverted residual structure where the residual connections are between the bottleneck layers. The intermediate expansion layer uses lightweight depth wise convolutions to filter features as a source of non-linearity. As a whole, the architecture of MobileNetV2 contains the initial fully convolution layer with 32 filters, followed by 19 residual bottleneck layers.

II LITERATURE SURVEY

AApplication of Face Recognition in Tracing COVID-19 Fever Patients and Close Contacts by Weijun Tan

We use thermal imaging, also called Infrared thermography, to measure human body's skin temperature. The diagram of the fever detection device. In this device, we use dual cameras - a thermal camera to measure temperature, and a visible-light RGB camera to do face detection and recognition. After a face is detected, the thermal camera locates the forehead of the person, and measure the skin temperature. To improve the accuracy, a black body can be used as a reference for the temperature measurement. The black body is usually installed at the place where people pass by, which makes the installation not convenient. In our device using a black body, it is hidden in the camera module, making it very easy to use. Our device can be a tablet, a camera, or a box with HDMI interface to separate display screen.

B An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network by Mohammad Marufur Rahman

A new strain which has not previously been identified in humans is novel coronavirus (nCoV). Coronaviruses (CoV) are a wide group of viruses which cause illness that range from colds to deadly infections like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The first infected patient of coronavirus has been found in December 2019. From that period, COVID-19 has become a pandemic all over the world . People all over the world are facing challenging situations due to this pandemic. Every day a large number of people are being infected and died. At the time of writing this paper, almost 16,207,130 infected cases have been confirmed where 648,513 are death . This number is increasing day by day. Fever, dry cough, tiredness, diarrhea, loss of taste, and smell are the major symptoms of coronavirus which is declared by the World Health Organization (WHO) . Many precautionary measures have been taken to fight against coronavirus. Among them cleaning hands, maintaining a safe distance, wearing a mask, refraining from touching eyes, nose, and mouth are the main, where wearing a mask is the simplest one. COVID-19 is a disease that spread from human to human which can be controlled by ensuring proper use of a facial mask. The spread of COVID-19 can be limited if people strictly maintain social distancing and use a facial mask. Very sadly, people are not obeying these rules properly which is speeding the spread of this virus. Detecting the people not obeying the rules and informing the corresponding authorities can be a solution in reducing the spread of coronavirus.

III HARDWARE COMPONENTS

A Raspberry PI

The Raspberry Pi is a credit card-sized computer with an ARM processor that can run Linux. This item is the Raspberry Pi 3 Model B+, which has 1 GB of RAM, dual-band WiFi, Bluetooth 4.2, Bluetooth Low Energy (BLE), an Ethernet port, HDMI output, audio output, RCA composite video output (through the 3.5 mm jack), four USB ports, and 0.1″-spaced pins that provide access to general purpose inputs and outputs (GPIO). The Raspberry Pi requires a microSD card with an operating system on it (not included). The Raspberry Pi is very popular, with lots of example projects and information available online.

Features

- 1.4 GHz quad-core BCM2837B0 ARMv8 64bit CPU
- 1 GB RAM
- VideoCore IV 3D graphics core
- Ethernet port
- dual-band (2.4 GHz and 5 GHz) IEEE 802.11.b/g/n/ac wireless LAN (WiFi)
- Bluetooth 4.2
- Bluetooth Low Energy (BLE)
- Four USB ports
- Full-size HDMI output

Figure 1: Raspberry PI

B Buzzer

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '-'symbol or short terminal and it is connected to the GND terminal.

Types of Buzzer
A buzzer is available in different types which include the following.

- Piezoelectric
- Electromagnetic
- Mechanical
- Electromechanical
- Magnetic

Figure 2:Buzzer

IV METHODOLOGY

Initially, face is detected and checks wheather the person is wearing mask or not.

If the person is not wearing mask, a buzzer sound is heard.

Even if the person is covering face with the hand also the alert sound is heard.

After face mask detection, the temperature of the person is measured. If the temperature of the person is more than the normal temperature the buzzer sound is heard.

YOLOv3 algorithm is being used for the face mask detection. Raspberry Pi is used for temperature detection.

V ARCHITECTURE

A Block diagram

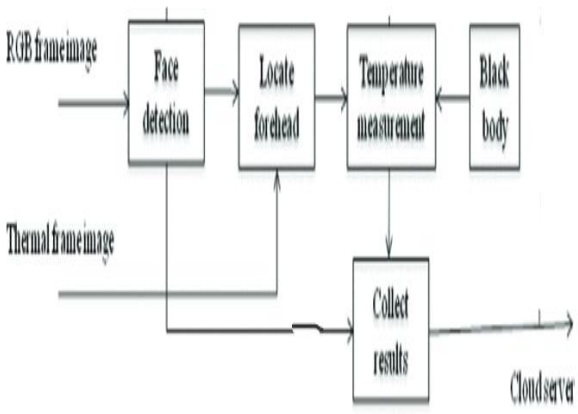

Figure 3: Block Diagram

BResult

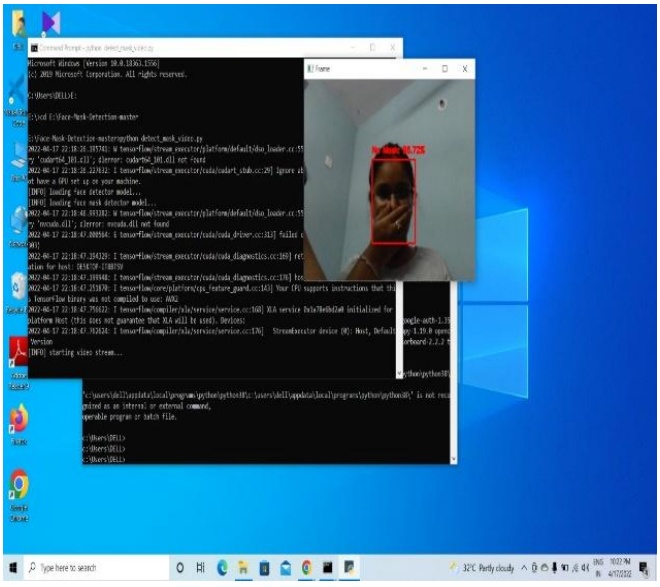

Figure 4: Result when the face is covered by hand

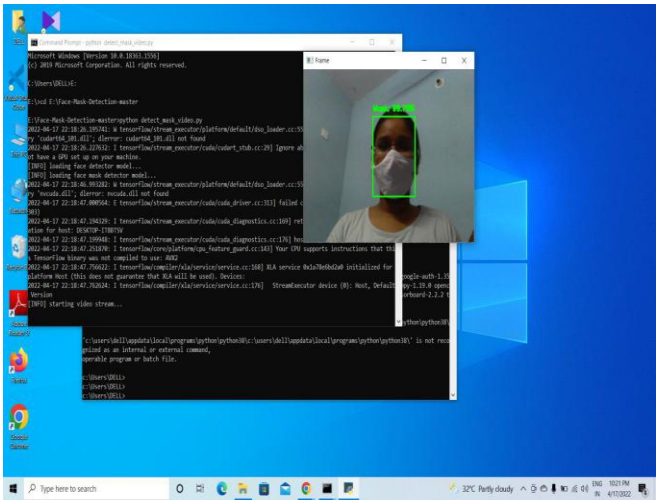

Figure 5: Result with mask

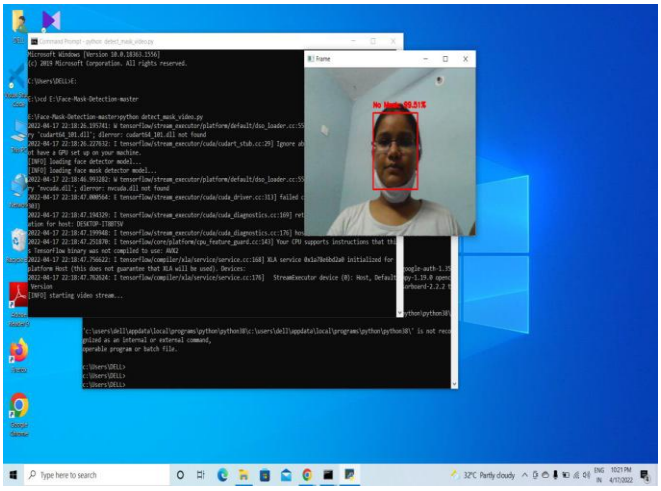

Figure 6: Result without mask

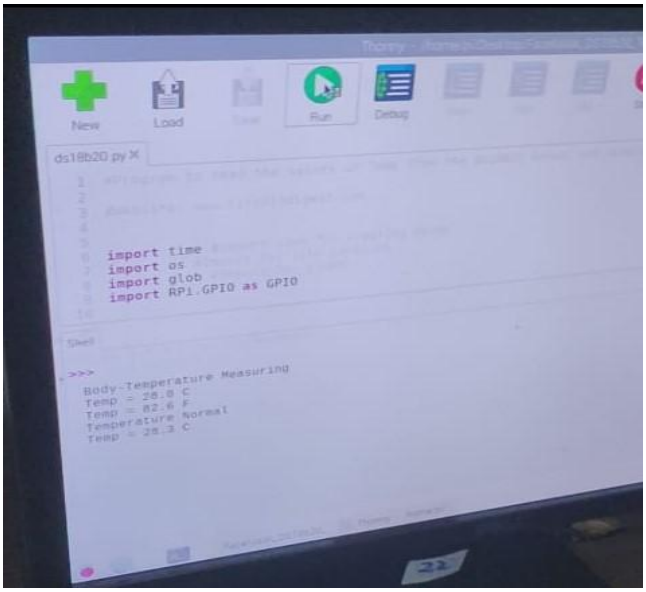

Figure 7: Body temperature is displayed

CONCLUSION

We develop a face recognition system to detect COVID-19 fever patients and to trace the patients and their close contacts. Experiment emulations show that they can detect fever patients and trace their close contacts. However, due to limitations in practical deployment, we cannot get more experimental data to prove the effectiveness of our approach. We hope this system can help control the spread of COVID-19 virus and save lives, and full-fill our mission to save lives. To moderate the spread of the COVID-19 pandemic, measures should be taken. We have demonstrated a facemask detector using Convolutional Neural Network and move learning techniques in neural organizations. To train, validate and test the model, we utilized the dataset that consisted of 1915 masked faces pictures and 1918 exposed faces pictures.

FUTURE ENHANCEMENTS

The present model proposed gives great accuracy for single face with and without mask. For multiple faces also it gives quite good accuracy. It works easily on any mobile device just by switching on the video stream, with no external hardware requirement. Further we will work for improving the accuracy for multiple face mask detection, to classify the faces into three categories that is, With mask, without mask, Improper mask instead of just the two with and without mask class by adding datasets with images of people wearing masks not covering their noses properly and also to detect the masked face using the FaceNet model of Convolutional Neural Network, so as to further improve our model and add marking attendance feature in it by detecting the face even when the mask is on.

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AUTHORS PROFILE

B.Jyothiis one of the co-authors of this paper. She has received Master of Technology in computer science and Engineering from Jawaharlal Nehru Technological University, Hyderabad in 2010, and she is Pursuing Ph.D in computer science and Engineering with major specialization on Trajectory Data Mining from JNTU Kakinada. She is currently working as Assistant Professor in the field of computer science and engineering, from Anurag Group of Institutions, Hyderabad, Telangana, India.Her research interests are in the fields of Data Mining and Big Data Analysis. She had published papers on ‘Education through soft learning in India’ and ‘Efficient load reblancing problem in hadoopdistrubuted file system’.

G.Meenais one of the co-authors of this paper. She was born in Telangana on September 25,2000. She is currently pursuing B.Tech. Degree in the field of computer science and engineering, from Anurag Group of Institutions, Hyderabad, Telangana, India. Her previous research interests are in the fields of Internet Of Things. Her current field of Interest is Machine Learning and Data Science. She is an active participant in the paper presentation events conducted at his college.

G.Pranathiis one of the co-authors of this paper. She was born in Telangana on July 7,2001. She is currently pursuing B.Tech. Degree in the field of computer science and engineering, from Anurag Group of Institutions, Hyderabad, Telangana, India. She is currently working at Capgemini as an Intern in Hyderabad. Previous research interests of her are in the fields of Internet Of Things. Her current field of Interest is Machine Learning and Data Science. She is an active participant in the paper presentation events conducted at her college.

P.Varshais one of the co-authors of this paper. She was born in Telangana on July 4,2000. She is currently pursuing B.Tech. Degree in the field of computer science and engineering, from Anurag Group of Institutions, Hyderabad, Telangana, India.H er previous research interests are in the fields of Internet Of Things. Her current field of Interest is Machine Learning and Data Science. She is an active participant in the paper presentation events conducted at his college.