Machine Learning Enabled-System for Screening Covid-19 Kind of Disease for Dense Population Sectors

Mohammed Mahaboob Basha[1*], P. Bhuvaneswari[2], V. Madhurima[3], Lachi Reddy Poreddy[4] and Srinivasulu Gundala[5]

[1]Department of Electronics and Communication Engineering, Sreenidhi Institute of Science and Technology (Autonomous), Hyderabad, India
[2]Department of Electronics and Communication Engineering, Sri Venkateswara College of Engineering and Technology (Autonomous), Chittoor, Andhra Pradesh, India
[3]Department of Electronics and Communication Engineering, S V College of Engineering (Autonomous), Tirupati, Andhra Pradesh, India
[4, 5]Department of Electronics and Communication Engineering, Lakireddy Bali Reddy College of Engineering, N T R Dt., Andhra Pradesh, India

*Corresponding Email : mmehboobbasha@gmail.com

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Abstract. *The Covid-19 and kind of pandemics flare-up has caused the world to suffer from health crisis and the situation in the developing countries is deplorable. The ever-growing cases are pushing the nation's well-being framework. The most effective way to protect yourself is to wear the face mask of your face in all areas of dense population. According to studies, wearing a mask reduces the chance of transmission. Cleanliness is a reference to practices that improve health and anticipation, specifically through orderliness, like hand washing. Hand washing is a great way of preventing transmission of virus which is transmitted through contact. A method of utilizing the human mind to build an environment that is solid and stable in a symbiotic environment that is strong and smart. A crossover model combining traditional and profound Deep Learning is going to be developed for mask recognition. In this paper we employ a training set to identify faces with a greater accuracy from live stream of camera. Infrared thermal sensors have been used for temperature estimation and safe following. Entryway regulators based on Raspberry Pi help security personnel avoid getting stuck in different locations, such as banks, entrances to schools, bank doors and medical clinic entrances. The validation factor of accuracy 0.97 and loss 0.02 were achieved.*

Keywords:

Covid-19, Machine learning, Detection, Power consumption, Rehabilitation,

1. Introduction

Under the conditions of COVID-19, thermal screening must be carried out before entering any place to verify the body temperature. However, because it involves taking the body heat of each person at a time, it is a time-consuming process. Simultaneously, service personal that do thermal screening must stand up for higher than 9 hours per day and inspect each person. It requires effort and time [1]. We are proposing a completely automatic temperature scanner and entry method to resolve this problem. It is a multifunctional system with a large variety of uses. A touch less temperature scanner and a mask monitor are used in the system. The scanner is immediately attached to the entrance, and if an individual with a high temperature or a without a mask is identified, that person will be refused for entry. The entrance to the site is only open for individuals with normal body temperature and appropriate masks. The system connects a temperature sensor, camera to Raspberry Pi system to operate the door. The Raspberry Pi evaluates the sensor data and decides to permit or not person entry. A warning will be displayed on the screen if a person is identified by the system for excessive temperature or no mask. The individual will not be permitted to access the premises and will be requested to complete the Covid-19 test instead. Chapter 2 describes about related research, chapter 3 demonstrates proposed system, chapter 4 results & discussion and 5 conclusion of the paper.

2. Literature Survey

An automatic method for COVID-19 kind of disease mask detection for a dense population sector is really useful. COVID-19 has had an impact on every field of development since it became a pandemic all over the world. Wearing a mask to prevent the transmission of COVID-19 is a critical step that everyone should take. In a dense population sector where all places are watched by CCTV cameras, this paper suggests a technique for detecting people who are not wearing a mask. When a person with no mask is spotted, the appropriate authorities

are notified via the smart network. However, under this approach, identifying person wearing mask that is travelling on any vehicle is challenging. Also, because it seems as though the individual is wearing a mask, this developed method is unable to detect faces obscured by hands.

Remote body temperature measurement for an indoor moving crowd is described in the paper, idea is to provide a method for image processing and automatic recognition and path tracking of moving people with high temperatures. This method is used to follow a person with a high fever who is travelling through a crowd. The technique employed in this approach is infrared thermograph, which is a remote sensing technique that uses emitted infrared light to measure temperature. This program may be used to check for fever in settings like schools, colleges, and movie theatres. This method may be used to track two separate persons walking down a trail, each with a different body temperature, who were then exposed to automatic fever detection to detect a human with a fever [2].

Raspberry-pi-based Smart Door System for Security. The major goal of the article is to create a security door lock technique using Raspberry-pi, which includes cameras, a keypad, and Pi-lids for an alarm system. This method works by taking photos of visitors using a code and a Raspberry Pi camera mounted at the entryway. When the image is captured for the first time, the house owner receives an email message with a photo of the person who requests to enter the residence. The image has been uploaded and verified. If authorized, an email message containing the entry code and the word "OK" will be sent to the database [3].

The second study we looked at face recognition under temporal difference conditions. We looked at the issues that face recognition systems have when dealing with infrared facial photos due to temporal changes in this research. These differences are mostly attributable to differences in meteorological conditions, physiological changes in the participants, and infrared detector responsively at the time of capture. Infrared face recognition systems suffer as a result of this. This paper's author produced a couple of face list that include confine gathering with real and varied situations. They've also provided two criteria for comparing data sets' temporal differences. Local duo binary pattern, online Weber linear descriptor, Gabor jet, scale variant characteristic transform, speeded up dynamic robust features were used to implement the thermal facial recognition system. Their findings showed that the local identical-based loom are mainly opposed to to temporal difference, are visible when there is a time delay with face photos, whereas the other methods are clearly not suited for practical infrared face recognition [4].

A Comprehensive Look at the COVID-19 and how IoT, Blockchain, Drones, AI, and 5G Can help Manage it. The emergence of the new corona virus in 2019 has put a number of governments around the globe in jeopardy. This COVID-19 pandemic began in China and has since spread throughout the world, posing a serious threat to every country [5]. The number of instances is rising at an alarming rate, and it is now affecting people all over the world. Since the COVID-2019 epidemic, fake information and misinterpretation have been distributed on a regular basis. This research also demonstrates that impact of health on global economy. To assist limit the bang of the COVID-19 epidemic, use various technologies such as the IoT, efficient artificial intelligence, block chain technology, 5G technology, among others.

The Internet of Things in Aftermath of COVID-19: A smart survey of assistance, confront, decision and evolution. The WHO has classified the new corona virus a entire global pandemic. It has reached in changes in people's lifestyles [6]. The world of IoT technologies has impacted major sectors of the global economy and industry. It examines how the Internet of Things and related sensor technologies have helped with viral detection, tracing, and spread. With the difficulties of developing sensor hardware in an environment where the virus is quickly spreading, the development of IoT architectures and administration has been enclave as a result of the global pandemic [7-10]. The level shifters have been used in Iot architectures uses cascaded transistors for low power but delay is high. This type of level translators is supplementary suitable for near threshold estimation and sheathing at deeper threshold voltage conversion, this could a main drawback in advanced digital circuits [11], [16].

3. Proposed System for Screening Covid-19 kind of Disease for Dense Population Sectors

The functional diagram of the planned model is depicted in fig 1. A camera, temperature sensor, buzzer, and servo motor are associated with the Raspberry Pi. The framework runs on a circle to perceive the face. At the point when somebody strolls before the camera, the code starts to run.

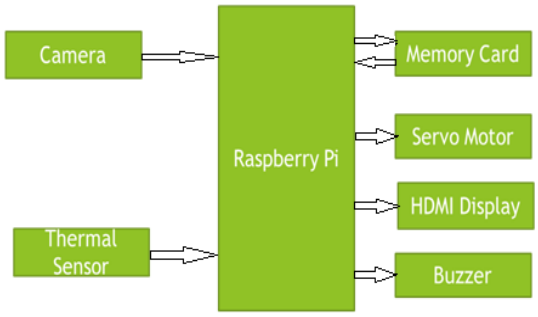

Fig. 1 Functional diagram of the proposed model

The individual's face is prepared casing by outline, with the help of Machine Learning concepts. If that individual is wearing the mask and assuming the temperature is distinguished beneath 37C by the

temperature sensor, a message will be shown on the screen of the HDMI display as MASK in green colour for wearing the mask, and for the temperature, the Celsius is shown in green color, subsequently the servo motor rotates its hinge 90 degrees, as it addresses the entryway. In the event that any of the above conditions are not met, the buzzer will start to ring, and the servo motor won't rotate the hinge.

3.1. Raspberry pi

Raspberry pi is the main element in the proposed research depicted in fig. 2. The connections of the remaining components are building according to the labelling of the Raspberry pi mentioned, which uses arithmetic operations [11-15]. It processes the result with the help of sensor signals. It is the functional unit of the proposed system.

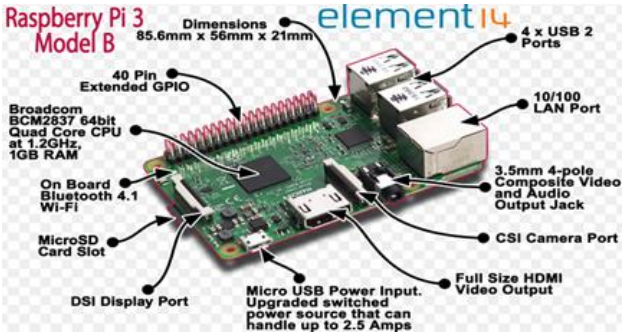

Fig. 2 Raspberry pi Module

3.2. Pi-Camera

This Pi-cam element is a tiny unit, light camera will work on Raspberry-Pi. It is basically used in machine learning, image processing, and surveillance applications. A 15-way ribbon wire connects to the CSI Camera port of Raspberry Pi as shown in fig: 3. Only two connections are required: the ribbon cable must be connected to the camera PCB and the Raspberry Pi itself. If you connect the cable the wrong way up, the camera will not work. Now we utilize the raspi-config tool we installed when we originally set up your Raspberry Pi to enable camera support. Pick and open Interfacing Options with the cursor keys, then select Camera and follow the prompts to enable the camera [19], [20], [21].

Fig. 3 Pi-camera

3.3. Infrared thermal sensor

This Infrared thermal sensor measures the thermal range of a person or an object in between -70 degree Celsius to 382.2 degree Celsius without any contact. It measures the object through IR-Rays when the object is in between 2 to 5 cm (approximately). The connections are established with the Raspberry pi as per the pin configuration of the thermal sensor is as shown in fig: 3. ML is a part of AI. It deals with the concepts that afford the ability for device to learn automatically. This can be done with the help of the algorithms. By using this ML, difficult tasks can be done with the help of the easy algorithms [22], [23].

Fig. 4 Infrared thermal sensor

3.4. Implementation

In this section, a detailed design of COVID-19 kind of disease for dense population sectors detection management system was developed. The modular approach of detection system is designed and presented the design along the four dimensions. The first approach is how to develop a elevated-level application that may be built on IoT platform using the edge learning and IoMT. The second approach is developed to deduce the hardware component of IoMT that will allow to support the application in power reduced manner. Next, the complete end-to-end hoard with developed and tag on by ML models for efficient assessment of detection system [24], [25], [26], [27].

The software architecture implementation acts like a channel for communicating purpose between the components, raspberry pi, pi-cam, temperature sensor MLX90614, servo motor, display. Coding is done in such a way that; the respective conditions are applied to get the respective result. Conditions are done with the help of library files which are available in the domain of machine learning. Then the total code is dumped in Raspberry pi which makes it to get executed. So that the working of the components gets succeeded. In hardware implementation, the peripheral devices like pi-camera, thermal sensor, Servo motor, display, buzzer, memory card are connected to the Raspberry pi. Connections are established at the General-Purpose Input Output (GPIO) of the Raspberry-pi.

4. Result and Discussion

An aggregate of 2 situations was tried. In situation 1, it estimated the temperature of the human body where the internal heat levels are not quite the same as grown-p and kids. If that individual has a temperature of 97^0F to 99^0F. Then, at that point, the individual has a typical temperature. On the off chance that he/she has a beneath or above temperature, they are recognized as low fever or high fever. So, it doesn't permit the following stage. In situation 2, we distinguished the facial mask for the individual whose temperature is ordinary, and we utilize various sorts of mask pictures to show various types of yields. If an individual keeps his mask over his nose so it permits the individual to the room and assuming an individual doesn't keep his cover beneath or wrongly, the bell ring and it doesn't permit the individual to the room and showed a message like a veil isn't distinguished in the figure. Thus, by considering the above two situations which is associated with the entryway, is opened and permitted the individual to the room. In this research work we've designed the first model of a dual-modal wearable temperature-scan system to combat COVID kind of disease that has been validated in the beginning stages and we have demonstrated the novel method of Machine Learning Enabled-system for screening of Covid-19 kind of disease for dense population sectors for accurately registering images of color and thermal properties independent of distance to work and the abundance of feature features [28], [29], [30]

4.1. Accuracy and Loss Prediction

For training the face-mask recognition algorithm, primarily we used face recognition algorithm support dlib library. Which have been used the total of 542 dynamic images and consisting of 250 images with the face mask, and the rest are not with face mask. Modified relocate learning by means of MobieNetV2 manner on a Tensor Flow support CNN style has used. The training & validation accuracy and loss of 0.97 and 0.03, respectively, are depicted in Fig. 5.

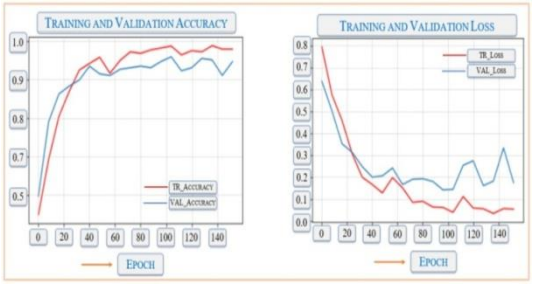

Fig. 5 Accuracy and Loss of the face mask detection system

The design has trained with multiple modules: object detections are with tool YoloV3, fore head, eye, & face detections are using dlib, and the thermal scanner reading of the face was used to decide body temperature of people, as depicted in fig.4. The design has tested on NVIDIA Nano. The alarming level has set at 37°C. The system was developed using Kaggle data-set for training camera images. and the resultant chart is exposed in Fig. 6. (a) Training and Validation Accuracy of 0.966 and Fig. 6. (b) loss of 0.02

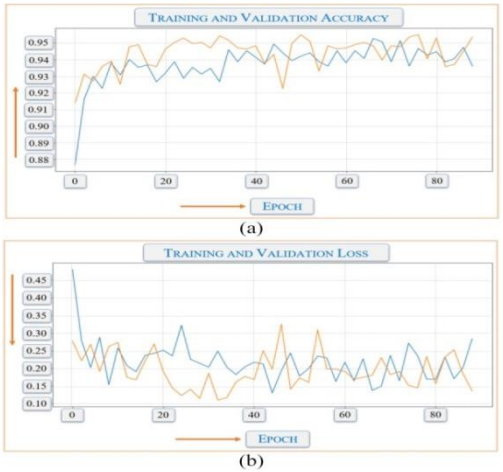

Fig. 6 Training and Validation Accuracy and Loss of Thermal screening

4.2. Measurement of Mask and Temperature

Covid-19 monitoring security Systems that are Health-aware gate Security Systems that are designed to ensure convenience in accordance with COVID-19 standards focal point on the user, which is evident in a lot of similar gate systems. These design tend to be biometric-oriented, depicted in fig. 7.

Fig. 7 Mask and Temperature detection display

High precision cameras are able to measure temperatures as high as 1.5 meters, and have the accurate range of +/-0.2^0C. As a solution of findings the prioritization is given to health conditions including facemasks and temperature. Facemasks bang the authentication process and, as a outcome, the majority of designs don't verify the uniqueness of users. The use of multiple sources to validate authenticating the user increases the cost for the gates. Early designs were centered on authentication, while more current designs include validate. There are more designs that detects on whether the user wears mouth mask, depicted in fig. 8. Face mask can make authentication more difficult. In

this research the system used to authenticate users using masks was able to achieve 97 percent precision, designs also check the temperature of the person; such designs were deployed thermal cameras for detecting the temperature, depicted in fig. 9.

Fig. 8 Mask Detection

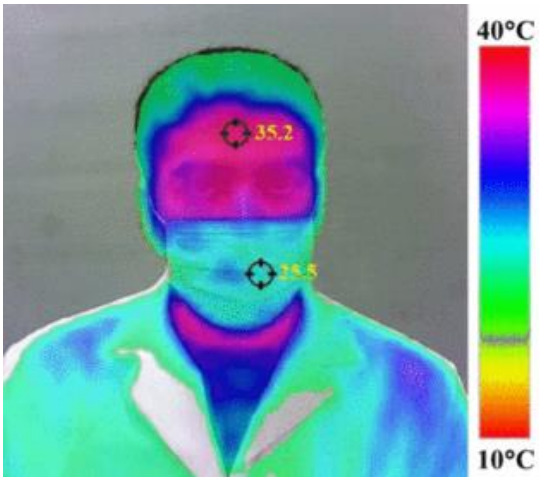

Fig. 9 Temperature measurement

5. Conclusion

As we all know that “Prevention is better than cure”, the proposed system prevents from spreading the disease from one person to another person and give more awareness to people to wear mask properly and maintain the social distance. Using the smart design, user data security, privacy, low delay and low-latency was achieved; the training & validation accuracy and loss of 0.97 and 0.03 for face mask detection, and Training and Validation Accuracy of 0.966, and loss of 0.02. Due to the shortage of dedicated health care people and pandemic travel limitations, specifically for elderly, in-home dedicated healthcare and covid symptom management will offer the next generation good healthcare support. This process can be future more extended that the person who recognised with symptoms of covid and test gives a positive result then the Aadhaar identification of Indian citizen of that particular person can get updated which will help the society. It can be planned to improve the system accuracy of applications and can be deployed real settings; can be in touch with hospitals for demonstrating the system.

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