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SAFE ENTRY USING CONVOLUTIONAL NEURAL NETWORKS

[1] Pothula Nithya Thushara Krishna, [2] Meghana MC, [3]Prashantika, [4] Tessy Rose R

[1] Student, [2]Student, [3]Student, [4] Assistant Professor

[1]Department of Computer Science Engineering

[1]MVJ College of Engineering, Bangalore, India

Abstract: Coronavirus has impacted practically every element of people's lives since December 2019. Even today, this remains a cause of distress for millions of people and businesses. According to studies, wearing a face mask and checking your temperature on a regular basis minimizes the risk of viral transmission and gives a sense of security. To avoid the spread of viral illness, the use of face masks and temperature checks in public locations must be rigorously monitored. It is not possible to manually monitor the processes of many persons. It is necessary to develop a smart system that can determine whether an individual is wearing a mask on his or her face and has a normal body temperature. The model shows how the face mask and temperature detection analysis are automated without the need for human intervention. Image processing and deep learning are used to recognize people's faces and classify them into two groups: those who wear masks and those who do not. The model has been trained using the MobileNetV2 architecture and is implemented using several python libraries such as Tenforflow, Keras, and opencv. The model has an infrared sensor for measuring the temperature of the human body. With this model, an individual who is responsible for monitoring people can sit in a remote location and still monitor effectively and take appropriate action. This device can be utilized as a digital scanning instrument at the entry of schools, hospitals, banks, and airports, among other places.

Index Terms **- Deep Learning, Open CV, Keras, Python, Tensor Flow, Computer Vision, Raspberry Pi, COVID-19.**

I. INTRODUCTION

Since December 2019, the outbreak of the epidemic has been affecting everyone worldwide. This effect has been an unfortunate situation for millions of lives and companies even today. As we know that coronavirus is a spreading disease, The World Health Organization (WHO) establishes enforced procedures such as obligatory face mask wear, rigorous social distance control in public spaces and regular hand washing or hand sanitizing by disinfectants. Studies have found that it is necessary to use facemasks to inhibit viral propagation. Research surveys show that 91% and 68% of N95 operating masks can effectively prevent the virus from spreading. The usage of these masks successfully perturbs airborne viruses, preventing these diseases from reaching the respiratory system of humans, and is a cost-effective means of mitigating deaths and breathing disorders. However, facing masks have usually been decreased in the public because of insufficient use of facemasks in preventing the transmission of illness. In order to reduce the spread, we need to always monitor whether a person entering in any place is wearing a mask and having normal temperature. By doing this the spread can be reduced by only allowing the authorized person to enter.

As the virus is a spreading disease and population is large, it is very risky for an individual to monitor each and every one, all the time. A smart system to control if a face mask is present and having a normal body temperature is needed. This model is a Raspberry Pi microcontroller-based automated facemask and body temperature detection system. It shows how masks and temperature detection and analysis are automated without human involvement. This system has its own camera module that monitors the facemask and a non-contact temperature sensor that reads the body temperature and tells the user whether they passed the COVID-19 protocols or provides an alert audio message.

Image processing and deep learning are used to detect people's faces and categorize them into two groups: those with masks and those without masks. We have used various python libraries such as Tenforflow, Keras, opencv etc and MobileNetV2 architecture to develop our model and an infrared sensor to measure the temperature. This model will give us personal protection and prevent the local pandemic. By this model the monitoring happens without the person being involved to check every time, he can remotely monitor them and be safe. This model gives us an audio output which makes it user friendly. This model can be utilized as a scanning tool at the entry to schools, hospitals, banks, and a variety of other public areas.

II. DESIGN

2.1 Raspberry Pi

The Raspberry Pi is a small, low-cost computer about the size of a credit card that connects to a computer monitor or television and uses a conventional keyboard and mouse. As a result, we could browse the internet and stream high-definition video, as well as perform spreadsheets or word processing and play games. In this model, we connected all of the components to the Raspberry Pi and run the application on it.

Fig.1

2.2 Camera Module

A Camera Module is used for this setup. The Raspberry Pi can work with any USB webcam. We've used the camera module here, which is ideal for compact Raspberry Pi projects with little space. This is sufficient in order to meet the model requirements. The Raspberry Pi 4 continuously receives signal from the Camera module for further calculations. It also has HD Support.

2.3 Ultra-Sonic Senor

This sensor is used to detect the presence of the object, such that if it detects an object then only the human body temperature is measured.

2.4 MLX90614 Non-Contact Infrared Temperature Sensor

The MLX90614 ESF is an Infra-Red thermometer for non-contact temperature measurements. We are using it here to detect body temperature. It has a range of -20 to 120 °C. It detects the body temperature of the person and sends the reading to the Raspberry Pi.

III. SOFTWARE & LIBRARIES

3.1. MACHINE LEARNING

It is a part of artificial intelligence (AI), that allows a machine to automatically acquire knowledge and learn from experience without the assistance of humans. Machine Learning mainly targets on improvement of system application which can access to data and predict output based on the input given. It takes data which can be experience, instructions and predicts the accurate output. Its main motto is to have less involvement of the human in giving assistance to the system.

3.2. IOT

The Internet of Things (IoT) is a term that describes the billions of physical objects that are linked to the internet and data collection and sharing on a global scale. IoT refers to a linked network of internet-enabled devices that may gather and send data via a wireless network without the need for human intervention. Making our environment smarter by integrating digital and physical realities, Internet of Things is changing the fabric of our everyday lives.

3.2 MOBILE NET

Mobile net is a convolution neural network model. It can be mainly used as a feature extractor in finding the object. It uses depth-separable convolutions to build light-weight deep neural network architectures. It is pretrained model where we have used it to train our model by transfer learning.

3.3 DEEP LEARNING

There is a class of Machine Learning called Deep Learning., it emulates the way we humans gain the knowledge. It is the main component of data science which comprise of statics and predictive modeling. It is advantageous to data scientists who are assigned with gathering, examining and interpreting huge quantity of data. Through Deep learning, it gives a way to automate predictive analysis.

3.4 OPENCV

Open CV is publicly available Computer vision and machine learning software library. It expedites for business to utilize and modify the code. This collection contains more than 2500 optimized algorithms, including a broad range of traditional and cutting-edge computer vision and machine learning techniques.

3.5 TENSORFLOW

A software library for dataflow and differentiable programming that is free and open-source, TensorFlow can be used for different types of work. A symbolic math library that is also used in machine learning applications such as neural networks. On February 11th, version 1.0.0 was released. TensorFlow can run on several CPUs and GPUs, unlike the reference implementation, which runs on a single device.

3.6 KERAS

Keras is a human-centered API, not a machine-driven one. Keras follows best practises for reducing cognitive load, including offering consistent and straightforward APIs, limiting the amount of user activities required in most usage situations, and delivering unambiguous and error indications that can be taken action on. It includes a substantial amount of documentation as well as developer instructions. Several typical neural-network construction components are implemented in Keras. Layers, objectives, activation functions, optimizers, and a myriad of other tools make it easier to work with picture and text input while simultaneously lowering the amount of coding required.

3.7 PYTHON

Python is a high-level, interpreter-based programming language that may be used for a variety of purposes. When it comes to the Python programming language's design, the emphasis is on readability. Programmers can use its language components and object-oriented approach to write concise, logical code for small and large projects. We utilized this language to develop the program for our model, it uses all of the above-mentioned libraries and many others.

IV. EXSISTING SYSTEM

A combination model using significant and conventional AI for face cover acknowledgment was presented. The proposed model involved two areas. The basic piece was for the part extraction utilizing Resnet50. Resnet50 is one of the standard models in huge exchange learning. While the subsequent part was for the space collaboration of face cover utilizing old style AI calculations.

ResNet-50 is a sort of huge exchange learning dependent upon remaining learning. ResNet-50 is a sort of huge exchange learning dependent upon remaining learning. ResNet-50's 50 layers are massive; they begin with a convolution layer and end with a completely related layer, and in the middle, 16 bottleneck debilitate each square has three layers of convolution layer. In get-together, the last layer in ResNet-50 was killed and supplanted with three standard Al classifiers to work on the model execution. Perhaps the most well-known and great oversaw learning with related learning assessments for treatment gathering and in attempts lose the faith designs in SVM. An assistance vector machine (SVM) is a directed AI model that uses plan estimations for two-bundle request issues.

The choice tree is a mathematical model that is based on entropy capacity and data acquisition. Choice Trees are a type of Supervised Machine Learning in which data is constantly divided by a defined boundary. Troupe approaches are AI computations that produce a variety of classifiers. The term "troop of classifiers" refers to a group of classifiers whose individual selections are converged.

Draw backs:

- Any machine learning algorithm can be used to categorise figurine (logistic regression, random forest and SVM). However, all machine learning techniques necessitated the use of appropriate features in order to perform classification. If you feed the classifier raw images, it will fail to categorise the images appropriately, and the classifier's accuracy will suffer.
- Large models, such as the ResNet-50, aren't feasible.
- Particularly when we need to make expectations regularly, for instance on constant video. A neural organization, for example, ResNet-50 which is a normal spine model utilized in the current framework will utilize an excess of force and is unsatisfactory for constant use.

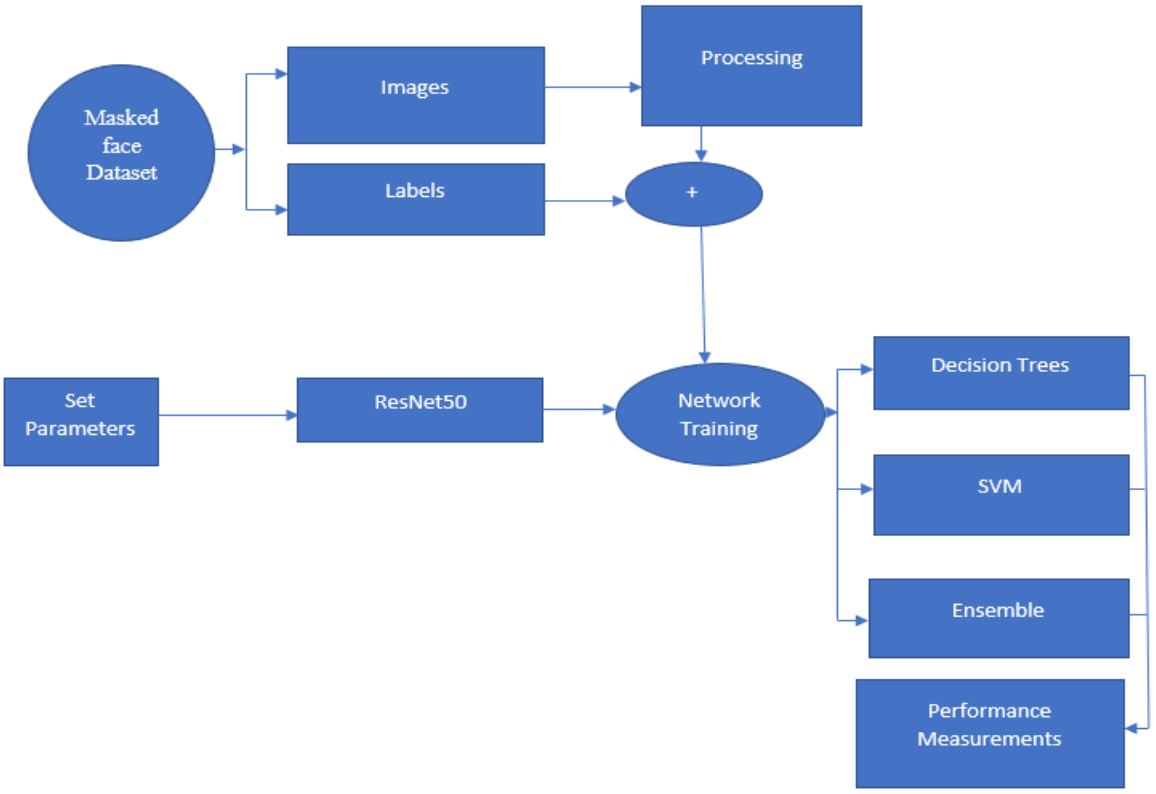

Fig.2

- ResNet has more boundaries and is bigger in size.
- ResNet is anything but a decent choice when the dataset isn't so enormous.
- Human body heat level recognition is absent.

V. PROPOSED SYSTEM

5.1 FACEMASK DETECTION

For developing this model, first step is we collected the imaged dataset where it contains two kinds of data, one is masked faces and other is without mask faces. We are training and testing accuracy of our model using images. After wrapping the data set next step will be processing the images where we convert the images into the array by using keras class called preprocessing and also, we do one hot encoding on labels which is converting categorical values to binary values by using Keras class called utils. Next step is to divide the preprocessed images for training and testing by using sklearn class called model _selection. Here we have used MobileNetV2 to trained our model. We employed MobileNetV2 in the form of a transfer learning idea because it is a pre-trained model and light weight. As a result of the trained model, we can tell whether or not someone has put on a mask or not.

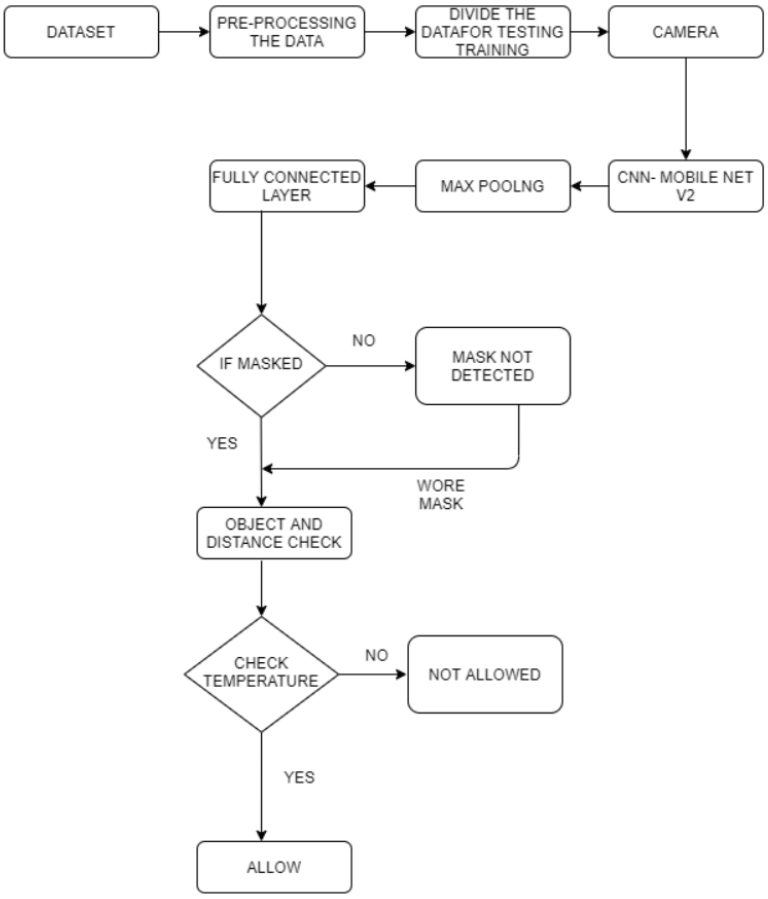

Fig.3

When we run model what happens is, with the help of the camera module we are able capture the live video. First the face is detected the video, once the face is detected we predict whether that face contains mask or not with the help of the trained model. If the face contains mask is predicted then, a green color rectangle around the face with accuracy is displayed indicating mask along with corresponding audio output. Otherwise, red color rectangle around the face with accuracy is displayed indicating no mask and an audio output alerting him to wear mask. If the mask is detected we instruct that person through audio to go for temperature check.

5.2 TEMPERATURE MEASUREMENT

Once the mask is detected, the user is given a voice instruction to go for temperature check. The temperature detection is done with the help of MLX90614 sensor, the user is instructed to place hand near the sensor. We first detect distance using ultrasonic sensor, when the distance criteria are met the temperature is detected. Both sensors are connected to Raspberry pi for detecting the temperature and ultrasonic sensor to ensure temperature is detected only when person places hand before it at appropriate distance. Based on the temperature values received, the user is allowed to enter or even given an alert message accordingly.

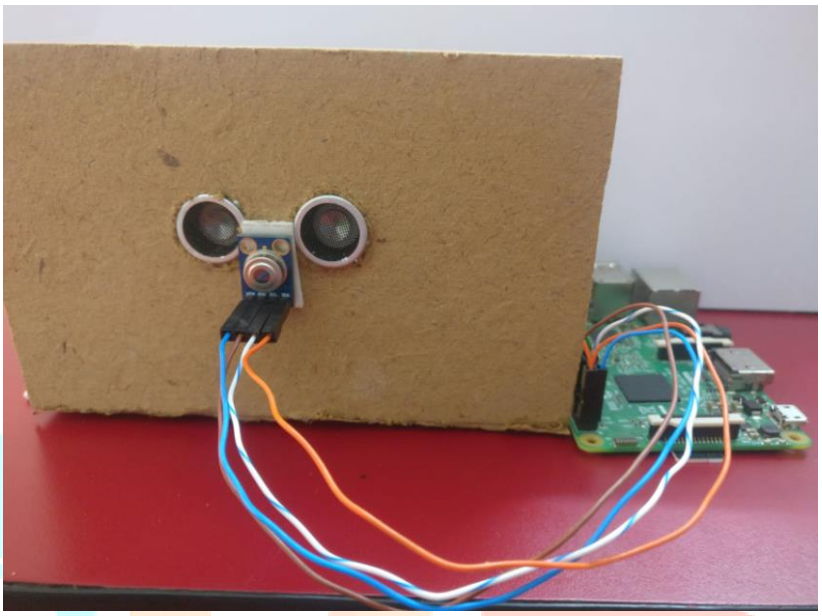

Fig. 4

VI. CONCLUSION

The spread of covid-19 has a large impact on the resources of every country, leading to the drastic changes in the lifestyle of the people. WHO rules- Face mask, sanitizing hands, limiting social gatherings. Due to the present pandemic situation of COVID-19, wearing a mask has become a new normal. Checking every person wearing a mask and is having normal temperature is a very difficult task as there are the chances of being infected. So, to overcome this, our project "Safe Entry using Convolutional Neural Network" is developed to reduce the human contact between each person which reduce the spread of virus. When we consider in a general way, getting in contact with one covid-19 affected person might reflect in attack of covid-19 for more than 10 persons at single stretch. So, to overcome this, the model is developed using deep learning concepts and IOT. It detects the face mask and body temperature. At each stage there is an audio output given which makes it user friendly. For the face mask detection, we have used using MobileNetV2 to train our model and for temperature measurement IR sensor is used. Only the person who following the covid protocols is allowed to enter. The model can be used at various public places in the entrance like schools, hospitals, etc. The main moto of this project is that reducing the human interaction in the entrance of public places and making it safe for all age people because wearing a mask is our new normal.

REFERENCES

[1] T. Meenpal, A. Balakrishnan and A. Verma, "Facial Mask Detection using Semantic Segmentation," 2019 4th International Conference on Computing, Communications and Security (ICCCS), 2019, pp. 1-5, doi: 10.1109/CCCS.2019.8888092.

[2] A. Das, M. Wasif Ansari and R. Basak, "Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV," 2020 IEEE 17th India Council International Conference (INDICON), New Delhi, India, 2020, pp. 1-5, doi: 10.1109/INDICON49873.2020.9342585.

[3] D. M. Altmann, D. C. Douek, and R. J. Boyton. What policy makers need to know about COVID-19 protective immunity. The Lancet, vol. 395, no. 10236 pp. 1527–1529, May 2020.

[4] Mohamed Loey, Gunasekaran Manogaran, Mohamed Hamed N. Taha, Nour Eldeen M. Khal. A Hybrid Deep Transfer Learning Model with Machine Learning Methods for Face Mask Detection in the Era of the COVID-19 Pandemic. Springer World Wide Web, Vol. 167 No. 3, July 2020.

[5] Prof. Dr. Christoph Lippert, Supervisor, Raza Ali, Saniya Adeel, Akhyar Ahmed, Md Hasan Shahriar, Md Shohel Mojumder. Face Mask Detector. Research Gate, July 2020, DOI:10.13140/RG.2.2.32147.50725.