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Covid-19 Mask Detection

Zuveriya, Ummehabeeba R, Asst. Prof. K B Drakshayini
Department of Information Science and Engineering,
VVIET, Mysore, India.
zuvizr@gmail.com, alizahriaz99@gmail.com, drakshakb@gmail.com

Abstract- **The COVID-19 epidemic has forced governments around the world to set limits on the transmission of the virus. A report shows that wearing the right face mask when in a public place and at work clearly reduces the risk of transmission. An effective and economical way to use learning tools to create a safe place to set up a device. With the ongoing epidemic, it is very important to have high quality applications and services designed to reduce risk. The COVID-19 epidemic is a catastrophe for mankind regardless of race, religion, gender and religion. The COVID-19 face mask detector uses in-depth reading techniques to effectively assess whether a person is wearing a face mask or not. Using a deep learning approach called the Convolutional Neural Network; you have found 98.6% accuracy. Cases where the mask is worn improperly are where the nose and mouth are partially covered as the mask is not worn.**

Keywords- **Deep Learning, Face Detection, Face Recognition, Neural Network, Tensor Flow, Covid-19.**

I. INTRODUCTION

The world is fighting the Covid-19 epidemic. There is very important anti-Coronavirus equipment. One of the most important is the Face Mask. At first, the face mask was not mandatory for everyone but as the day went on scientists and doctors recommended everyone wear a face mask.

Now to find out whether a person is wearing a face mask or not, we will use the process of getting a face mask Wearing a face mask will help prevent the spread of infection and prevent a person from getting any infectious germs in the air. When someone coughs, sneezes can release germs into the air that may infect others nearby. Facial masks are part of an infection control strategy to eliminate contamination.

The practice of wearing masks in public is growing as a result of the global COVID-19 coronavirus epidemic. Before Covid19, People used to wear a mask to protect their health from air pollution. While some people are self-conscious about their appearance, they hide their feelings in public by hiding their faces. Scientists have confirmed that wearing face masks is effective in preventing the transmission of COVID-19 introducing a face mask model based on in-depth learning and linking neural networks.

The corona epidemic has boosted the unprecedented level of scientific cooperation around the world. Artificial Intelligence (AI) based on machine learning and in-depth learning can help combat Covid-19 in many ways.

Mechanical studies allow researchers and medical professionals to evaluate large amounts of data to predict the distribution of COVID-19, to act as an early warning system for potential diseases, and to identify people at risk. People are required by law to wear public masks in all countries.

These laws and regulations were developed as an act of growing growth in conditions and deaths in many places. However, the process of monitoring large groups of people becomes more complicated. Precautionary measures include the discovery of anyone who does not cover their face. Here we present a face-to-face modelling model based on computer perspective and in-depth learning.

The proposed model can be integrated with surveillance cameras to prevent the transmission of COVID-19 by allowing the detection of people wearing masks who do not wear face masks. Model integration between in-depth learning and traditional machine learning methods with OpenCV, solid flow, and Cameras. We used an in-depth codec output transfer and integrated it with three machine learning algorithms. [1]

We presented a comparison between them to find the most suitable algorithm that gained the highest accuracy and spent less time on the training and acquisition process. The model built into this study can be made on surveillance cameras to prevent the transmission of COVID-19 transmission by non-wearing masks. [6]

II. LITERATURE REVIEW

Object discovery is one of the most relevant topics in image processing and computer vision. From the smallest, to the personal use of large industrial applications, object acquisition and recognition are used in a variety of industries. A few examples include image search, security, OCR, health care, and agricultural surveillance.

There are many problems when the machine is facing learning acquisition from a small training database. Machine performance depends largely on the features used to represent the object.

Specifically, features such as OpenCV facial features such as haar were used to identify facial recognition, Principal Component Analysis (PCA) was hired for rapid removal of facial features and Euclidean Distance was also adopted for facial recognition; as such, the amount of data and computer complexity will be effectively reduced in face recognition, and face recognition can be made on an embedded platform. [3]

The new method used for object acquisition is YOLO. A single neural network predicts binding boxes and class opportunities directly from full-blown images in a single test. Since the entire acquisition pipe is a single network, it can be made to end directly in the acquisition function. Their basic YOLO model processes real-time images at 45 frames per second.

There is also a quick image that works before processing with the introduction of a brightly coloured elliptical mask engraved on the face. Used in conjunction with the DCT, feature releases, the MPL and RBF Neural Networks, in phases, allows the implementation of the program without changing the global calculation weight and reducing the learning time of MLP neural networks.

Image processing, which is part of signal processing, takes a picture in the form of an image or video frame input and removes the image or sets of features related to the image. Image editing is done mainly with the help of the OpenCV library. OpenCV contains various tools for solving computer vision problems. Contains low-resolution image processing functions and advanced face detection algorithms, feature matching and tracking.

III. PROPOSED SYSTEM

The proposed system can be integrated with CCTV cameras and that information can be tracked to see if people are wearing a mask. When this person comes out the door. This person may be wearing a mask or not wearing a mask. A CCTV camera looks at faces and detects people without masks. That person will be denied access and may see a message from the screen or panel that displays a specific type of warning message. Access will be denied until you apply the mask. Authorities will be notified by email in real time if the person is not wearing a mask. [7]

Mask recognition during this study was done with a machine learning algorithm in the form of image separation: MobileNetv2. MobileNetV2 could be a Google-supported Convolutional Neural Network (CNN)-based approach developed by Google for improved performance and optimization. There has been a lot of discussion about the most in-depth learning methods for human adoption. This inspired us to come up with our own algorithm to solve this problem. [2]

Our task in obtaining a face mask consists of data collection to deal with the variations of face types worn by employees. Face mask detection model is a combination of face detection model to identify existing faces from the camera feed and use those faces with the mask detection model.

The proposed program focuses on how to identify a person in a photo / video stream wearing a mask with the help of computer visualization and in-depth learning algorithm using the OpenCV, Tensor flow, Keras, and PyTorch libraries. Figure 1 shows 2 ways and steps to get a face mask: [3]

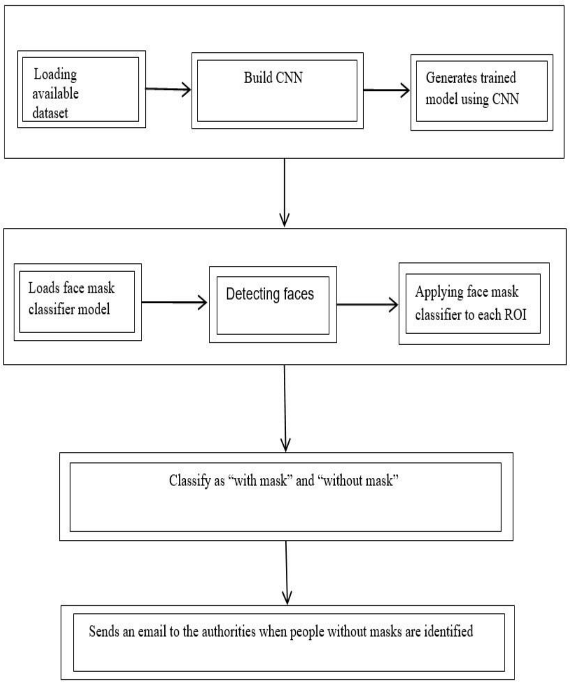

Fig 1. Flow chart of proposed system.

IV. METHODOLOGY

Every model is divided into two main steps:
1. Training Phase:
In this step, the database is loaded and the model is trained in the database and stored back on disk.

2. Release Phase:
In this step, a trained model uploads and acts as a face mask detector and separates images and real-time video streams into two "mask" and "no mask" categories.[2][5]
Face detectors allow the inclusion of facial features such as eyes, nose, eyebrows, mouth and jaw. The detector

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helps to identify the region of interest (ROI) in facial images and extract the ROI. Then facial features are identified.

The model uses various steps described as follows:
Step 1: Data Correction- The data used in this study contains 1238 images of various masks and no mask people. All images are colour coded and therefore all are required to be converted to Gray. All images are resized (100x100) to the same pixel values. The Database is divided into training and testing sets at 75:25 averages with 825 images set and 207 images in the test set.

Step 2: Training CNN - The convolutional model used in this study is a two-layer network. To avoid overcrowding, Dropout method is included. As there are two categories of images "mask" and "no mask" binary cross entropy is used as a loss function. During CNN training, 50 times were used. The RelU activation function is used as an internal layer function and the SoftMax is used as the output layer function.

Step 3: Finding Real Tracks by No_Mask - A trained model is downloaded from disk and the camera is set. The camera can be a webcam camera or a mobile camera. In this case, the label is made with "without mask". A red rectangular rectangle is used. The camera is used to watch live streaming videos and the streaming video is read frame by frame and converted to Gray and faces are available. The result indicates a possible no mask and mask effect. Figure 3 and figure 4 show the output from the streamed live video stream labelled "without mask" when the person is not wearing a mask.

V. ARCHITECTURE

Figure 2 shows a model that is developed by the following steps (1) data collection, (2) pre-processing, (3) data classification, (4) model design, (5) model testing, and finally (6) use modelling.[1]

Fig 2. Steps in Building the Model.

1. Data Collection:

Mask event Recognition model begins with data collection. The database trains data for people who use the mask and do not use it. The model will distinguish between people wearing masks not. By building the model, this study uses 1.916 data with a mask and 1.930 data without a mask.

In this step, the image is cropped until the only object visible is the face of the object. The next step is to label the details. The data collected were recorded by two groups; the mask on and off as shown in Figure 3. After the data was labelled, it was grouped into two groups. [3]

Fig 3. Depiction of 2 datasets to be trained.

2. Pre-Processing Phase:
The pre-processing phase can be the pre-training phase and knowledge test. There are four steps within the pre-processing that change the image size, convert the image to the same members, pre-processing install using MobileNetV2, so the last one makes hot code coding on the label as shown in Figure 4. Be a critical pre-processing step in computer view due to performance of training models. The smaller the image size, the higher the model.

With this tutorial, resizing the image makes the image 224 x 224 pixels. The next step is to process all the images within the database into a list. The image is converted into the same members you call the loop function. In which case, the image will become accustomed to processing first using MobileNetV2.

Therefore, the final step during this phase makes hot code coding because most machine learning algorithms cannot use direct data input. They require all the variables of the input and the output variations to be numeric, including this algorithm. Details with a label will be converted into a number label; therefore, the algorithm can understand and process data. [3]

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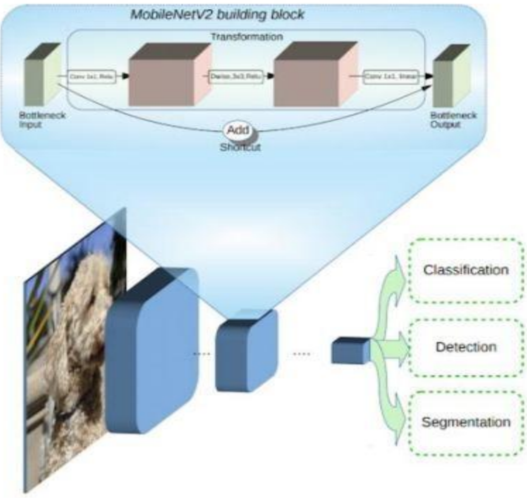

Fig 4. The Pre-processing phase using MobileNetV2.

3. Separate Details:
After the pre-processing phase, the data is divided into two groups, which is 75 percent training data, so the rest of the data is analysed. Each collection contains both masked and non-masked images.

4. Building Model:
In this section forms a building model. There are six steps in building a model that creates a magnification image generator, the model below and MobileNetV2, adding model parameters, model integration, and model training, so the last one maintains a long-term prediction model.

5. Test Model:
To ensure that the model can accurately predict, there are steps to test the model. The first step is to make a prediction on a test set. The result of 20 repetitions in the loss and accuracy view when training the model.

Fig 5. The output of the video frame detecting face mask.

6. A Model is used:
The model is used within the video. The video is read from frame to border, and then the face detection algorithm is applied. Once the face is detected, proceed with the following procedure. From found frames containing faces, re-processing will be done including resizing the image, converting to the same members, processing the input using MobileNetV2. Alternatively, the video frame will also record the person wearing a mask or percentage of consideration as shown in Figure 5. [1]

VI. RESULT

From the results of the two dividers, it is evident that the ADAM performance of the Haar cascade classifier is very good. During testing, it is evident that the Haar Cascade separator produces good results with high accuracy. [4]

The data used in this study contains 1238 images with hidden and unidentified faces as shown in Figure 3. The 50-point model provides 95% better accuracy than most other neural networks used for face detection. This paper also provides a detailed illustration of validation Loss and Training Loss and the Validation Accuracy and Training Accuracy shown in Figures 6 and Figure 7 below and is helpful in making better decisions.

This model is capable of analysing live streaming videos and distinguishes masked and non-masked people and the Figure 8 and Figure 9 below is extracted from the live streaming video analysed by this model.[8]

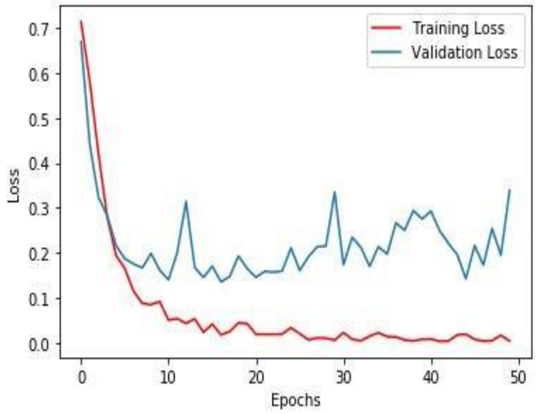

Fig 6. Training Loss and Validation Loss VS epochs.

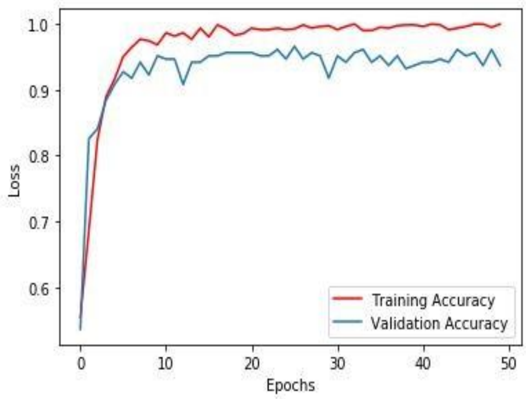

Fig 7. Training Accuracy and Validation Accuracy VS epochs.

Fig 8. Live Streaming Video captured no mask person.

Fig 9. Live Streaming Video captured no mask person.

VII. CONCLUSION

The Covid-19 mask provides a real-time measure of safety for people by finding out whether a person wearing a mask or not as wearing a mask is an essential requirement of the hour in the COVID-19 epidemic. The accuracy provided by the neural network in the image database is 95% possible in the future using the Mobile Net neural network as a spinal example.

This model can be done in different spheres of government in different market places, airports, train stations, and other densely populated areas to ensure that people follow safety measures.

In the future, this model can be embedded with an alarm or buzzer and the IoT can be used for in-depth reading of CNN which will buzz whenever it is discovered that a person is not wearing a mask. If this model is well distributed it will be useful to ensure human safety.

VIII. FUTURE SCOPE

On the CPU, the model currently offers 5 FPS inference speeds. We hope to upgrade this to 15 FPS in the future, making our solution suitable for CCTV cameras without using a GPU. In the field of mobile shipping, Learning Machines are becoming increasingly common. As a result, we want to transform our models into a version of TensorFlow Lite. Tensor can be integrated into our design. We believe that there are many other situations that can be included in this approach to provide a complete sense of security.

Here are a few of the things that are currently used: Coughing and sneezing, According to WHO guidelines, chronic cough and sneezing are one of the first symptoms of Covid-19 infection and are one of the main pathways for transmitting the virus to infected people Key Covid-19. Second, the heat test was performed with hand-held IR thermometers, which required health workers to get close to the person being tested, which puts them at risk of infection and makes it difficult to monitor individual temperature.

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