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FACE MASK DETECTION

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Abstract : From the past Dec 2019 we all are fighting against the virus called Coronavirus (COVID-19). Still (2022) we are fighting against this virus. This virus is becoming new variant frequently like Delta, Omicron and Covariant, causing people all over the world. When an infected person coughs, sneezes, sings, or breathes, the virus spreads in little liquid particles from their mouth or nose. To avoid contracting the virus, we must all take precautions such as wearing a mask, cleaning hands frequently, and keeping social distance. Some persons will not wear a mask due to carelessness or negligence. So need to alert people to wear mask. To overcome this problem come up with this project "FACE MASK DETECTION". It will distinguish people who are not wearing mask properly and give an alert message to concerned authorities.

IndexTerms **-** Coronavirus (COVID-19).

I. INTRODUCTION

The SARS-CoV-2 virus causes Coronavirus (COVID-19) disease, which is an infectious disease. Fever, throat ache, cold, cough, and body pain are common symptoms of COVID-19 infection. People over the age of 65, as well as those with underlying medical disorders such as diabetes, cancer, or respiratory disease, are at risk for serious illness. COVID-19 can affect anyone of any age group and cause death at any age.

When an infected person breathes, speaks, sneezes, coughs, or sneezes, the virus spreads in little liquid particles from their mouth or nose. If infectious particles come into direct contact with the eyes, nose, or mouth, the virus spreads through the air. People can also become infected by touching their eyes, nose, or mouth after coming into contact with virus-infected things.

This paper come with solution to find people wear mask properly or not using YoloV4-tiny and Fast R-CNN algorithms to achieve less weight model. By detecting we can alert the concerned authorities to take actions against them.

The remainder of this paper will be organized in the following manner: Section two is literature survey. Section three is Dataset. Section four is Hardware Requirements. Section five is Methodology.

II. LITERATURE SURVEY

Paper [1] Arjya Das, Mohammad Wasif Ansari and Rohini Basak, uses some fundamental machine learning programmes like Tenserflow, Keras, OpenCV, and scikit-Learn to offer a simplified technique to achieve this goal. This accurately recognises the face in the image and then determines whether or not it has a mask on it. A cascade classifier and a pre-trained CNN with two 2D convolution layers are used in this method. This method can be expanded to determine whether or not a person is wearing the mask correctly.

Paper [2] Riya Chiragkumar Shah and Rutva Jignesh Shah used 2911 images and Collected dataset from kaggle and RMFD. They proposed face mask detection utilising the MobileNetV2 convolutional neural network for face mask detection. Transfer learning was used. Transfer learning is the process of training a current model with a previously taught model. Precision and recall were both 99 percent.

Paper [3] Eashan Adhikarala and Brian D. Davison provides a new real-world face mask identification dataset based on webcam photos collected from various places. There are eight object detection models and four face detection models in total. All eight models' performance characteristics were listed.

Paper [4] MobileNetV2 Model for Image Classification. In this paper Ke Dong, Yihan Ruan, Chingji Zhou and Yuzhi Li concentrated more on comparing MobileNetV1 and MobileNetV2 model than image classification. Results demonstrated that MobileNetV2 model achieved higher accuracy rate compared to MobileNetV1.

Paper [5] Roshan M Thomas, Tintu Samson, Motty Sabu and Shihana Mol proposed face detection model using Convolution Neural Network(CNN) and Deep Learning for Real time detection and Recognition. In single and multiple face photos, this model can distinguish human faces. Noise removal and hole filling in colour photos, as well as augmentation, were done as part of the preprocessing.

Paper [6] Susanto, Febri Alwan Putra, Riska Analia, Ika Karlina Laila Nur, Face mask detection was proposed using the YOLO V4 deep learning method. The YOlO V4 is capable of running twice as quickly as the other deep neural network for object detection. Politeknic Negeri Batam has deployed this real-time face mask programme. It's a model with a lot of muscle. Low-end gadgets are unable to compute.

Paper [7] Mohamed Almghraby, Abdelrady Okasha Elnady, Face mask detection was implemented using deep learning, Tenser flow, Keras, and OpenCV. The classifier uses the MobileNetV2 architecture as a foundation to do real-time mask identification. Using 1800 photos with and without a mask, it was trained on a smaller dataset. 1000 photos were utilised for training and 800 for testing from the dataset. Due to the limited dataset, there is a risk of underfitting.

Paper [8] Samuel Ady, Sanjaya and Surya Adi Rakhmawan, MobileNetV2 is a proposed machine learning algorithm that uses the picture classification approach. Google has created MobileNetV2, which has enhanced performance. The steps for implementing the model are collecting data, pre-processing, splitting the data, testing the model, and implementing the model. The developed model can tell whether or not someone is wearing a face mask.

Paper [9] Mr. Kalla Kiran, Bokka Vamsi Kiran, Devarapalli Cheswanth Sai, Gaggala Vijay Vamsi, Pitta Rani Salomi, to address issues with the current system, a face mask detecting method has been proposed. Code completion, syntax and error highlighting, linter integration, and rapid fixes are all features of the existing system for coding aid and analysis. They successfully detected face mask violations using PyCharm, Notepad++, and Jupyter.

Paper [10] Preeti Nagrath, Rachana Jain, Agam Madan, Rohan Arora, Piyush Kataria, suggested a real-time DNN-based face mask detection system based on MobileNetV2 and a single shot multibox detector (SSDMNV2). Both the training and development of the image dataset, which was separated into two groups of persons wearing masks and people wearing masks but not wearing masks, were completed successfully. The OpenCV deep neural networks approach utilized in this model produced the greatest results. MobileNetV2 image classifier was used to classify the image in a unique and accurate way.

III. RESEARCH METHODOLOGY

3.1 Dataset

Two dataset will be used for this experiment. The model is trained and tested using a dataset. It is collected from kaggle and google. It consists of with or without mask images.

Fig 1

It consists of front pose without mask images.

Fig 2
It consists of front pose with mask images.

3.2 Hardware Requirements

This section will explain about hardware components required for real time use. As shown in Fig 3 we require webcam, PC, speaker. For detection we will use YoloV4-tiny or Fast RCNN by comparing accuracy. This model will be deployed in the PC. The concerned authorities will be alerted by a buzzer if a person is not wearing a mask or not wearing properly will pass by.

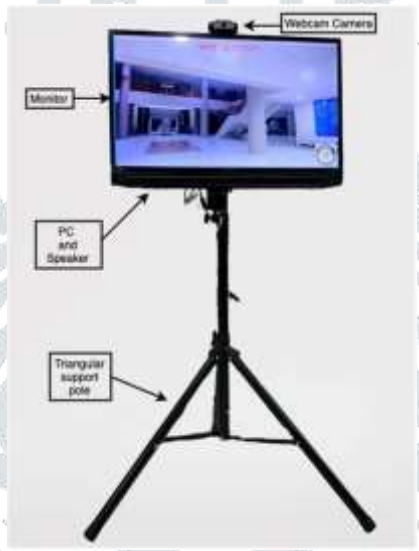

Fig 3
Face mask detection hardware is depicted in this diagram.

3.3 Methodology

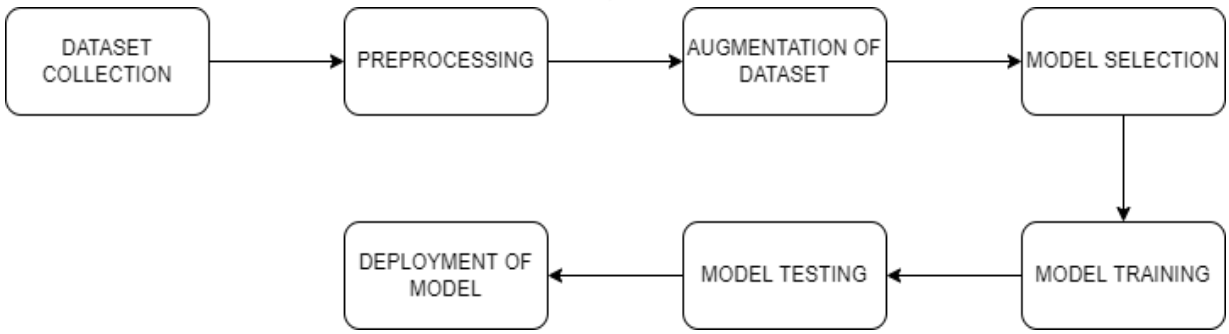

Fig 4
Block Diagram

a. Dataset Collection

With or without mask dataset as been collected from kaggle and google.

b. Data Preprocessing

This phase is performing before training and testing of the data. In this there are four steps to perform that is resize, converting to an array, labelling, one hot encoding. First is converting all images uniformly with respect to size for the effectiveness of the model. Next step is to process all the images into an array. Then labelling all with or without mask

images. And the last step is performing one hot encoding because many machine learning algorithms will not be performed directly on labelled data.

c. Data Augmentation

Data Augmentation will help to increase our data by making alterations to already existing data. Such that by rotating angle, zooming etc.

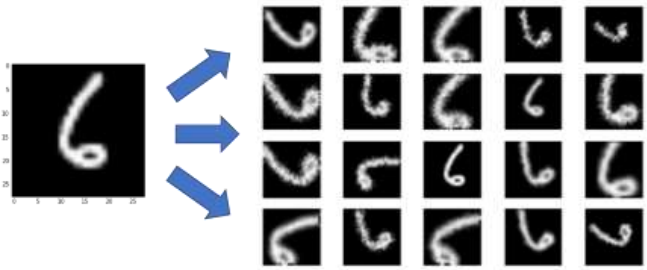

Fig 5 Shows example for data augmentation

d. Model Selection

It is the process of selecting one model as final model for our project from the collection models.We will be choosing YOLOV4-tiny and Fast R-CNN Algorithms because faster training and testing rate and works for low end devices [11]. YOLOv4-tiny's size has been drastically decreased. The CSP backbone's number of convolutional layers is reduced. There are two YOLO layers instead of three, and there are fewer prediction anchor boxes.

e. Model Training

Training the model by feeding 80% of split data. It consists of the sample output data and the corresponding sets of input data that have an influence on the output.

f. Model Testing

Testing of the fully build model by feeding 20% of split data. By checking result of this we will conclude about the model.

g. Deployment of the model

Creating a Machine Learning model is not enough until we make it available to public use or to specific client use. After the building and testing the model now it is ready to use.

IV. RESULTS AND DISCUSSION

As we know this Coronavirus disease became our part of life mask is compulsory to prevent ourselves from Coronavirus. This model helps to predict if person wear mask or not with light weight model. If not wear mask, gives an alert to concerned authorities. This method will be very helpful for the society concern.

Future research can be send an alert message to specific person who does not wear mask and also to the concern authority.

V. ACKNOWLEDGMENT

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