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Face Mask Detection Using Deep Learning and Computer Vision

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Abstract: ***COVID-19 pandemic has rapidly affected our day-to-day life the world trade and movements. Wearing a face mask is very essentials for protecting against virus. People also wear mask to cover themselves in order to reduce the spread of covid virus. The corona virus covid-19 pandemic is causing a global health crisis so the effective protection method is wearing a face mask in public area according to the world health organization (WHO). The covid-19 pandemic forced government across the world to impose lockdowns to prevent virus transmission report indicates that wearing face mask while at work clearly reduce the risk of transmission .we will use the dataset to build a covid-19 face mask detector with computer vision using python,opencv,tensorflow,keras library and deep learning. Our goal is to identify whether the person on image or live video stream is wearing mask or not wearing face mask this can help to society and whole organization to avoid the transfer of virus one person to antother.we used computer vision and deep learning modules to detect a with mask image and without mask image.***

Keywords: face detection, face recognition, CNN, SVM, opencv, python, tensorflow, keras.

I. INTRODUCTION

The trend of wearing face masks in public is rising due to covid-19 corona virus epidemic all over the world. Before covid-19 people used wear a mask to protect their faces from pollution and sun rays. Some people are self-conscious about their look they hides their faces. More than five million case were affected by covid-19 in less than 6 month across 188 countries the virus spread through close contact and crowded and overcrowded area like public place, mall, college etc. People are forced by laws to wear face mask in public in many countries these rules and laws were developed as an action to the exponential growth in case and death in many area. Here we introduce a face mask detection model that is based on computer vision and deep learning the proposed mode can be integrated with surveillances camera to impede to covid-19 transmission by allowing the detection of people who are wearing mask or not wearing a face masks. We used deep learning and computer vision model with opencv tensor flow and keras we used dataset for training and live stream video detect people are wearing a face mask or not our project have high accuracy we used less time for execution.

II. TECHNOLOGY USED

1) OpenCV
2) Keras
3) Python
4) VS code
5) Dataset
6) Webcam

Algorithm like svm, cnn, face detector and face recognition.

III. MAIN MODULE OF SYSTEM

A. Creating a dataset
B. Train image from dataset
C. Train face mask detector
D. Apply face mask detector
E. Detect face in live video stream
F. Detect people wear a mask or they have without mask.

- *Purpose:* The main purpose of this system to detect the face of people who wear a face mask or not in public place as well as overcrowded place. If they are not were mask then take action against them who not wear a mask this can help as to reduce the transmission of virus and contact of people are avoid it help as to building a new healthy society.

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IV. METHODOLOGY AND OVERVIEW OF SYSTEM

The various step are performed in the methodology of project.

1) We have create a dataset with mask and without mask
2) Train this dataset with accuracy.
3) Apply face detector recogniser algorithm to dataset.
4) Apply face mask detector
5) Train mask detector detect the face in webcam with mask and without mask from dataset as well as live video stream.

The various image with high accuracy are created with different posture and store in database and name that image as training dataset with mask and without mask. They are store in database or in folder.

Train the image with svm algorithm and cnn algorithm train it with mask dataset and without mask dataset. Face detector is used to train the image from dataset.

After it recognised the face and apply face detector algorithm detection and training of dataset are done and show the people who wear a mask and not wearing face mask.

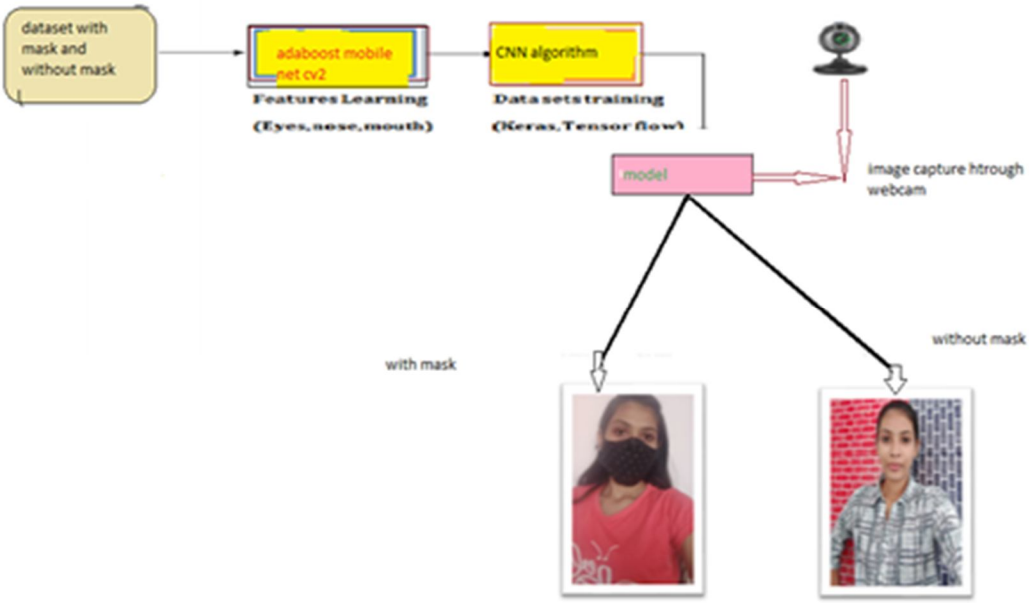
Face detector apply to all image then select one and train it they show that the people wearing a face mask show green rectangular box and those who are not wearing a mask they show red rectangular box around their face.

We also detect face in live stream people wearing mask show green rectangle and people without mask show red rectangle and show warning message to wear their mask.

V. ALGORITHM USED

We used face mask detection and face recognition and support vector machine (SVM) and CNN convolutional neural network algorithm for mask detection by using python opencv they identify the image with high accuracy and increase the performance of project cnn capture the image in webcam and recognised face detect face mask and tensorflow, keras, opencv are used in computer vision and deep learning.

1) CNN algorithm CNN architecture capable of detecting masked and unmasked faces and can be integrated with pre-installed CCTV cameras.
2) Ad boost algorithm and face detection algorithm are used.
3) Ad boost was invented by Freund and Schapire in 1997.
4) Ad boost was applied to face detection with modification by viola and jones in 2001.
5) The detection speed of 0.07 second per frame of size ~300*300 on a standards desktop in 2001 to 2004.



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VI. EXECUTION PROCESS

The given dataset are train with the face mask detector in webcam as well as live video stream.
The first dataset are with mask dataset and select the one of them and then detect the person face show image are with mask or without mask. And if the mask is not wear they show a warning with red rectangular box around the face.



Picture from dataset with mask and without mask they are train with face mask detector with webcam and then shows a result as green rectangle box with mask image and around without mask image and give the warning to wear a mask.

A. Execution

1) The data is collected with masks and without masks.

2) The software required:

Anaconda navigator, Google coolab, and python library like keras, opencv, Tensorflow,Numpy, matplotlib.

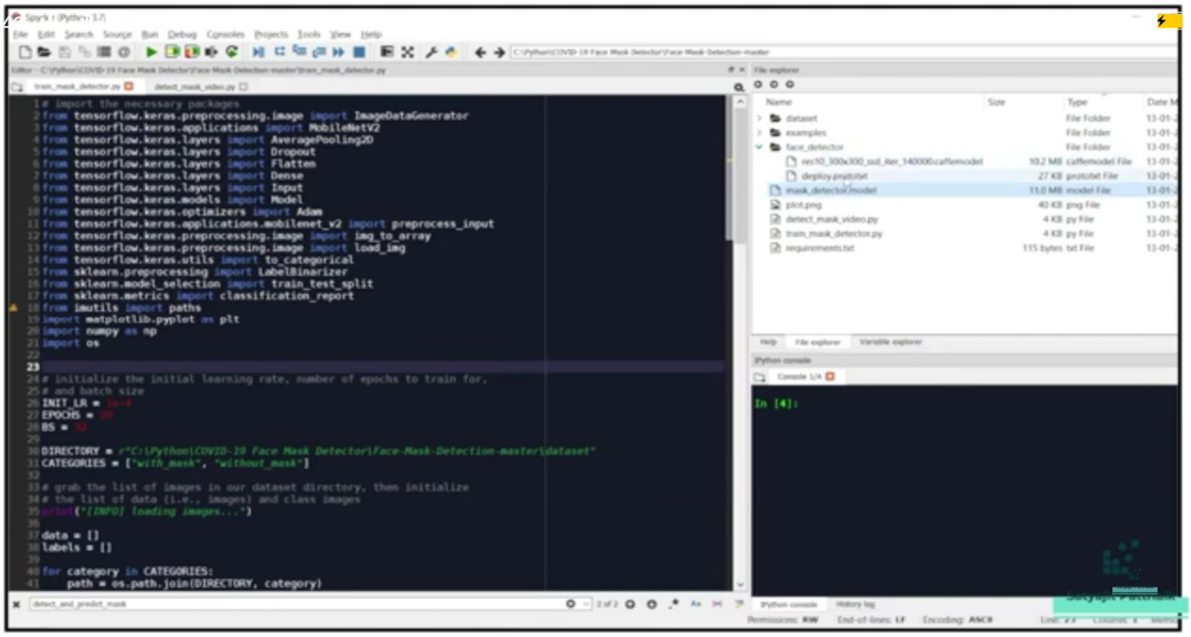
The major requirement for implementing this project using python programming language and deep learning, computer vision.cnn algorithm is used for implementation.

a) Implementation: Dataset collecting: - we collect no. of data sets with face mask and without masks. We get high accuracy depending on no. Of image.

b) Datasets Extracting: We can extract features using mobile net v2 of mask and no mask sets.

c) Models Training: We will train the model using opencv, keras (python library).

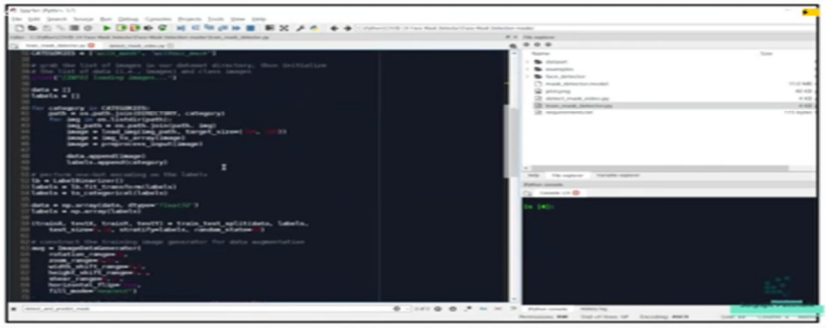
d) Facemask Detection: We can detect Pre-processing image and also detect live video. If people wearing masks they permit otherwise they take an action in this way we prevent transmission of virus.



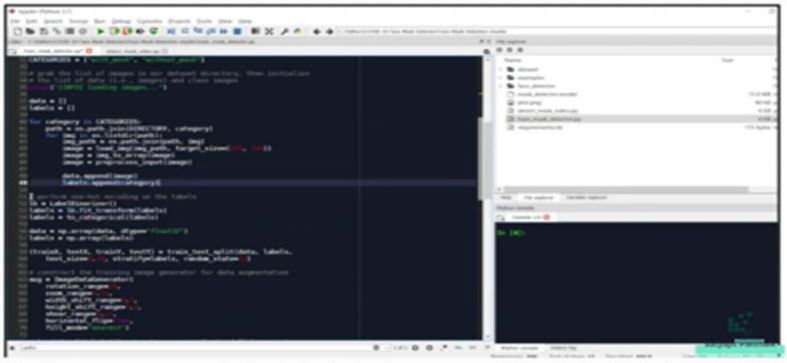
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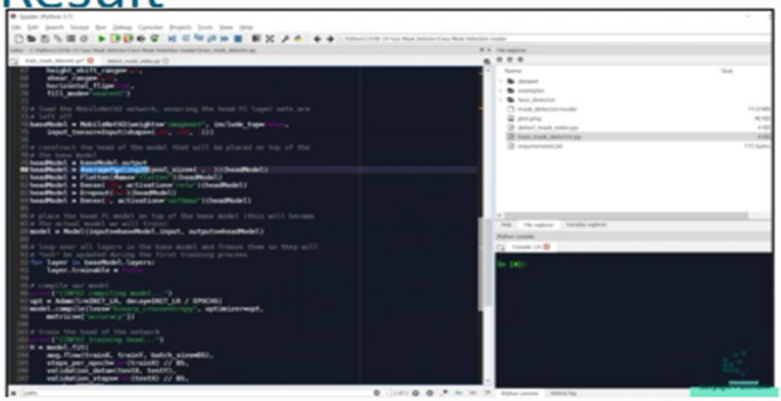
Result

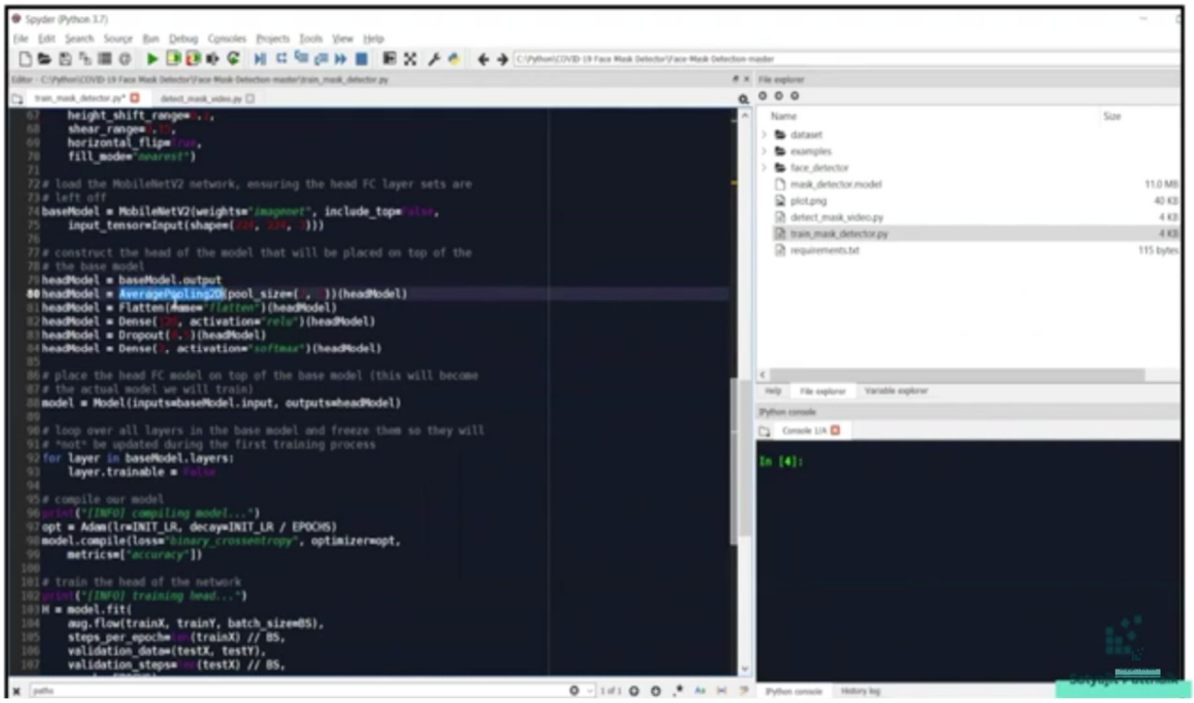


Result

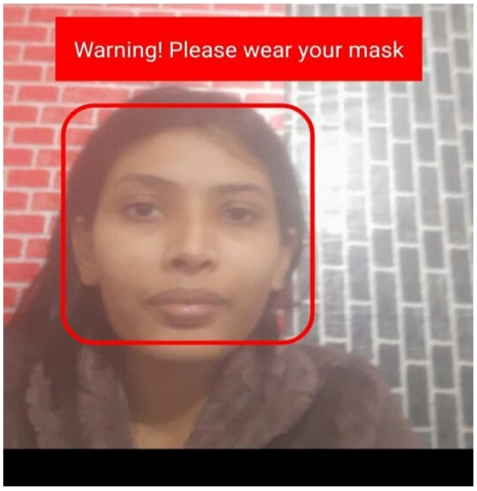


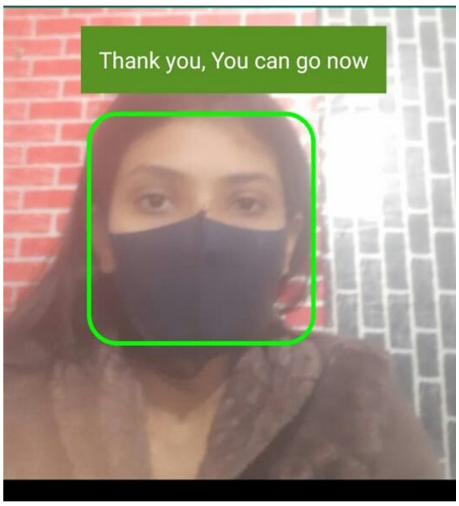
Result





VII. OUTPUT





Without mask with mask

VIII. BENEFITS

1) Manual monitoring is very difficult for officers to check whether the people are wearing mask or not .so in our technique we used live camera to detect people without mask easily and also prevent from virus transmission.
2) It has fast and high accuracy
3) This system can be implemented in public places.

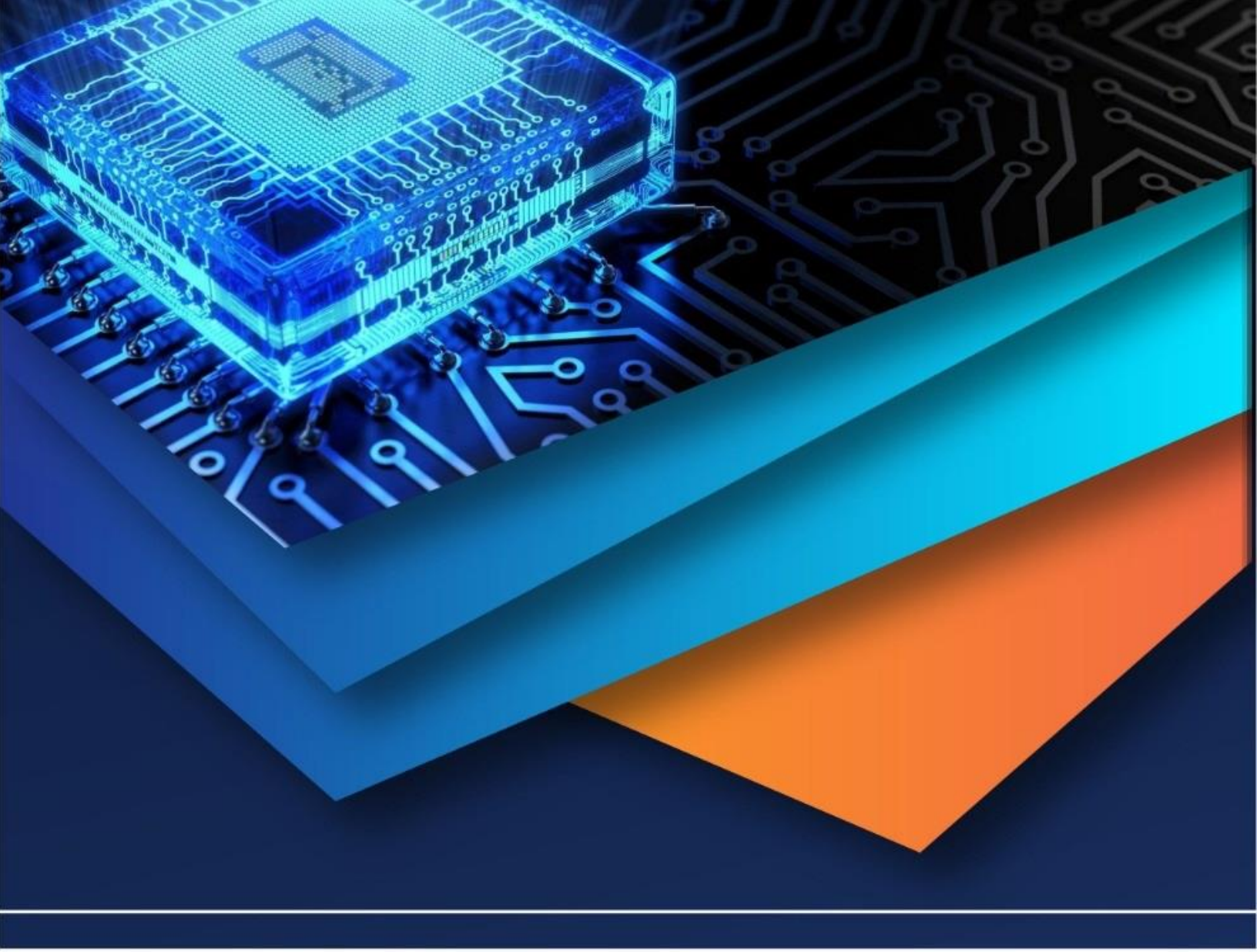
We can keep people safe from our technique.

IX. CONCLUSION

1) By the development of face mask detection we can detect if the person is wearing a face mask and allow their entry would be of great help to the society.
2) We can prevent peoples from virus transmission through this system.

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