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Face Mask Detection using Python

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Abstract: With the rise of pandemic the face mask became one of the most essential part of human life. This project aims to ease the maintenance of the rules and regulations by the authorities. This system will do the task of detecting the percentage mask worn on a person's face. This way it will detect if a person has worn the mask or if he/she has worn it properly such that it would prevent the infections. If the mask is not worn then the person would be highlighted and post the detection, we can raise an alert if used in public places
Keywords: Face mask, Python, MobileNetV2, Detection, highlighted.

I. INTRODUCTION

Nowadays the whole world is wearing masks due to COVID-19 corona virus epidemic. Scientists have proved that wearing a mask helps to stop COVID-19 transmissions. Due to its fast spreading across the world WHO has declared COVID-19 as a global pandemic. Wearing the face masks are one of the important preventive measures given by them it is useful as it not only stops the people from getting infected but it also help the infected people to not infect others. But we should wear the face mask correctly, it should be covering our mouth, nose entirely. In order to check if the person is wearing mask correctly or not we can use machine learning technique.

Face Mask Detector is the solution to check whether people are wearing masks correctly or not, in percentage. We have used Dataset, Keras, Machine Learning, MobileNetV2, OpenCV, Python, Tensorflow. Face mask detection will help the government and private bodies. It will help to stop carelessness of people and can even be used to punish them. It can also be used to get the data of number of people following the norms in different cities. It will detect as mask and no mask and it will also start an alarm, beeping as soon as it detects person without a mask.

II. LITERATURE REVIEW

In the background of the COVID-19 pandemic, institutions Behind the scenes of the COVID-19 pandemic, organizations, for example, the institute experience the ill effects of for all intents and purposes shut around the world assuming the current circumstance won't change. Coronavirus otherwise called Serious Acute Respiratory Syndrome Corona infection 2 is an irresistible illness that is set free from a contaminated debilitated individual who talks, wheezes, or hacks by respiratory beads. This spreads rapidly through close contact with anybody tainted, or by contacting articles or surfaces impacted with an infection. There's still as of now no immunization accessible to ensure against COVID-19 and forestalling openness to the infection is by all accounts the main technique to defend ourselves. Wearing a facemask that covers the nose and mouth in a public setting and regularly washing hands or the utilization of at minimum 70% liquor based sanitizers is one method for trying not to be presented to the infection. In the midst of the headway of innovation, Deep Learning has demonstrated its viability in acknowledgment and characterization through picture handling. The examination concentrate on involves profound learning procedures in distinctive facial acknowledgment and perceive in the event that the individual is wearing a facemask or not. The dataset gathered contains 25,000 pictures utilizing 224x224 pixel goal and accomplished an exactness pace of 96% concerning the exhibition of the prepared model. The framework fosters a Raspberry Pi-based constant facemask acknowledgment that cautions and catches the facial picture assuming the individual recognized isn't wearing a facemask. This review is gainful in battling the spread of the infection and keeping away from contact with the infection[1]

In the new occasions, the Coronaviruses that are a major group of various infections have become exceptionally normal, infectious and perilous to the entire mankind. It spreads human to human by breathing out the contamination breath, which leaves drops of the infection on various surface which is then breathed in by other individual and gets the disease as well. So it has become vital to ensure ourselves and individuals around us from the present circumstance. We can avoid potential risk, for example, social separating, washing hands like clockwork, utilizing sanitizer, keeping social separation and the main wearing a cover. Public utilization of wearing a veil has become extremely normal wherever in the entire world at this point. From that the most impacted

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and destroying condition is of India because of its outrageous populace in little region. This paper proposes a strategy to identify the facial covering is put on or not so much for workplaces, or some other work place with a many individuals coming to work. We have utilized convolutional neural organization for the equivalent. The model is prepared on a genuine world dataset and tried with live video real time with a decent exactness. Further the precision of the model with various hyper boundaries and numerous individuals at various distance and area of the edge is finished.[2]

This task plans to recognize facial coverings and social removing on a video feed utilizing Machine Learning and Object Detection. TensorFlow and Keras were utilized to fabricate a CNN model to distinguish facial coverings and it was prepared on a dataset of 3800 pictures. Just go for it Object location was utilized to recognize individuals in a casing and check for social removing by ascertaining the Euclidean distance between the centroids of the identified boxes. Fostered an Android application named "StaySafe" where the client will be advised and can screen the infringement.

For this reason, Firebase was utilized as the backend administration. Assuming that an infringement is identified it will transfer the picture

to a Firebase Cloud Storage with a notice, and the client will actually want to see these pictures on their Android

application alongside the date and time. Firebase Cloud Messaging administration was utilized to send notices which will

be taken care of in the android application. The application offers different elements like review history, saving the picture to the gadget, erasing the pictures from the cloud and so on A hotness guide can likewise be seen which features swarmed

districts which can assist authorities with distinguishing the locales that should be cleaned all the more frequently. At present, even with the wellbeing emergency brought about by the Coronavirus COVID-19 which has spread all through the around the world. The battle against this pandemic has turned into an unavoidable reality for some nations. It is presently a matter including numerous spaces of examination in the utilization of new data advancements, especially those connected with man-made reasoning. In this paper, we present a clever commitment to help in the battle against this pandemic. It concerns the identification of individuals wearing covers since they can't work or move around as common without security against COVID-19. In any case, there are a couple of exploration learns about facial covering recognition. In this work, we researched utilizing diverse profound Convolutional Neural Networks (CNN) to separate profound elements from pictures of appearances.

The separated elements are additionally handled utilizing different AI classifiers like Support Vector Machine (SVM) and K-Nearest Neighbors (K-NN). Were utilized and inspected all various measurements like exactness and accuracy, to look at every model exhibition. The best characterization rate was getting is 97.1%, which was accomplished by joining SVM and the MobileNetV2 model. Regardless of the little dataset utilized (1376 pictures), we have gotten exceptionally agreeable outcomes for the discovery of covers on the faces.[3]

Coronavirus or Severe Acute Respiratory Syndrome Corona infection 2 is an amazingly contagious infection that is released through breathing beads let out of a contaminated person who is talking, wheezing, or hacking. Close collaboration with an individual tainted or through contacting a debased surface and item can spread the infection quickly.At this point, there is no antibody to battle the COVID-19, and the most ideal way to shield the individual from an infection is to try not to be presented to it. Wearing a facemask that covers the nose and mouth in a public setting and more than once purifying of hands or the utilization of at minimum 70% liquor based sanitizers is a training to keep away from infection openness. Profound Learning innovation has shown its accomplishment in acknowledgment and arrangement by handling pictures. The exploration concentrate on utilizes profound learning methods that distinguish assuming the individual is wearing a facemask or not and check in the event that the people in the space notice physical separating. The gathered picture information contains 20,000 pictures, consistently crop pictures in 224x224 pixels, and accomplished an exactness pace of 97% during the preparation of the model. The created framework is executed utilizing Python and OpenCV through TensorFlow that perceives people wearing a facemask or not wearing and measures the actual distance between every individual. It flags a caution and catches facial pictures after recognizing people not wearing a cover and doesn't notice physical removing. This review is useful in fighting the spread of the infection and keeping away from contact with the infection.[4]

This composition portrays the advancement of a framework for perceiving individuals, in any event, when they are utilizing a facial covering, from photos. An order model dependent on the MobileNetV2 design and the OpenCV's face indicator is utilized. Consequently, utilizing these stages, it very well may be distinguished where the face is and it tends not really settled whether or not it is wearing a facial covering. The Face Net model is utilized as a component extractor and a feedforward multi-facet perceptron to perform facial acknowledgment. For preparing the facial acknowledgment models, a bunch of perceptions comprised of 13,359 pictures is created; 52.9% pictures with a facial covering and 47.1% pictures without a facial covering. The exploratory outcomes show that there is an exactness of 99.65% in deciding if an individual is wearing a veil or not.[5]

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III. METHODOLOGY/EXPERIMENTAL

1) Step 1 Installing all required Libraries

Installing the required libraries like OpenCV, Keras, Sklearn and others.

2) Step 2 Installing Dataset

This model will differentiate between people wearing and not wearing masks so We installed our dataset. The next step is labelling the data. The data which has been collected labelled into two groups; with and without a mask. After the data has been labelled, it is grouped into those two groups.

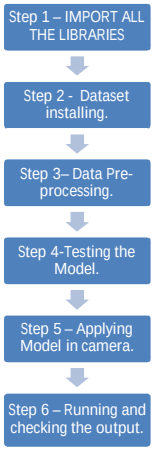


Fig 3. Flowchart

3) Step 3 Data Pre-processing

Data pre-processing is divided in four steps which are resizing image as we know more the smaller size of image better will be the model so we will resize images to 224 x 224 pixels, converting image into array, pre-processing input using MobileNetV2 and last is performing hot encoding on labels.
The next will be splitting the data.

Final Step: Implementing the model:
Step 4: Testing the model
Step 5: Applying camera in the model
Step 6: Running and checking the output

The model implemented in the video. The video needs to read from frame to frame, for the face detection algorithm to work. If a face is been detected, then it proceeds to the next step. From the frames that detected the containing faces, reprocessing will be carried out which would be including resizing the image size, converting to the array, pre-processing input using MobileNetV2. The next step is to predict the input data from the model which is saved. Predicting the input image which has been processed using a model built earlier. The video frame will also be labelled according to whether that the person is wearing a mask or not and also predictive percentage. It will also start beeping if person is not wearing mask.

IV. RESULTS AND DISCUSSIONS

A. A system that can detect the face mask on a person's face.
B. The system detects the percentage as per the mask covering the face of a person and can help to identify safety level based on this percentage.
C. It can be used in crowded places to reduce the amount of people wearing masks by interfacing the system in a CCTV camera.
D. This System will help to maintain the norms of Social Distancing and Wearing Face mask at places where there is a public gathering.
E. It will help to create access points at public places where entry would be permitted only when the person wears a face mask.

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V. FUTURE SCOPE

1) To Deploy this system at locations of Mass populations remotely so as to maintain the observations of rules and regulations in a strict manner.

2) To integrate the system with a GSM module so that it can raise an alert to the authorities if mass violation happens.

VI. CONCLUSION

In this project, a machine learning model is created for face mask detection using Python, Keras, and OpenCV. We developed the face mask detector model for detecting whether if the person is wearing a mask or not. We trained the model using Keras with network architecture. Training the model was the first half of our project and testing it using the webcam using OpenCV the second half. This system can therefore be used in real-time applications and places where required face mask detection for safety purposes due to outbreak of covid-19.

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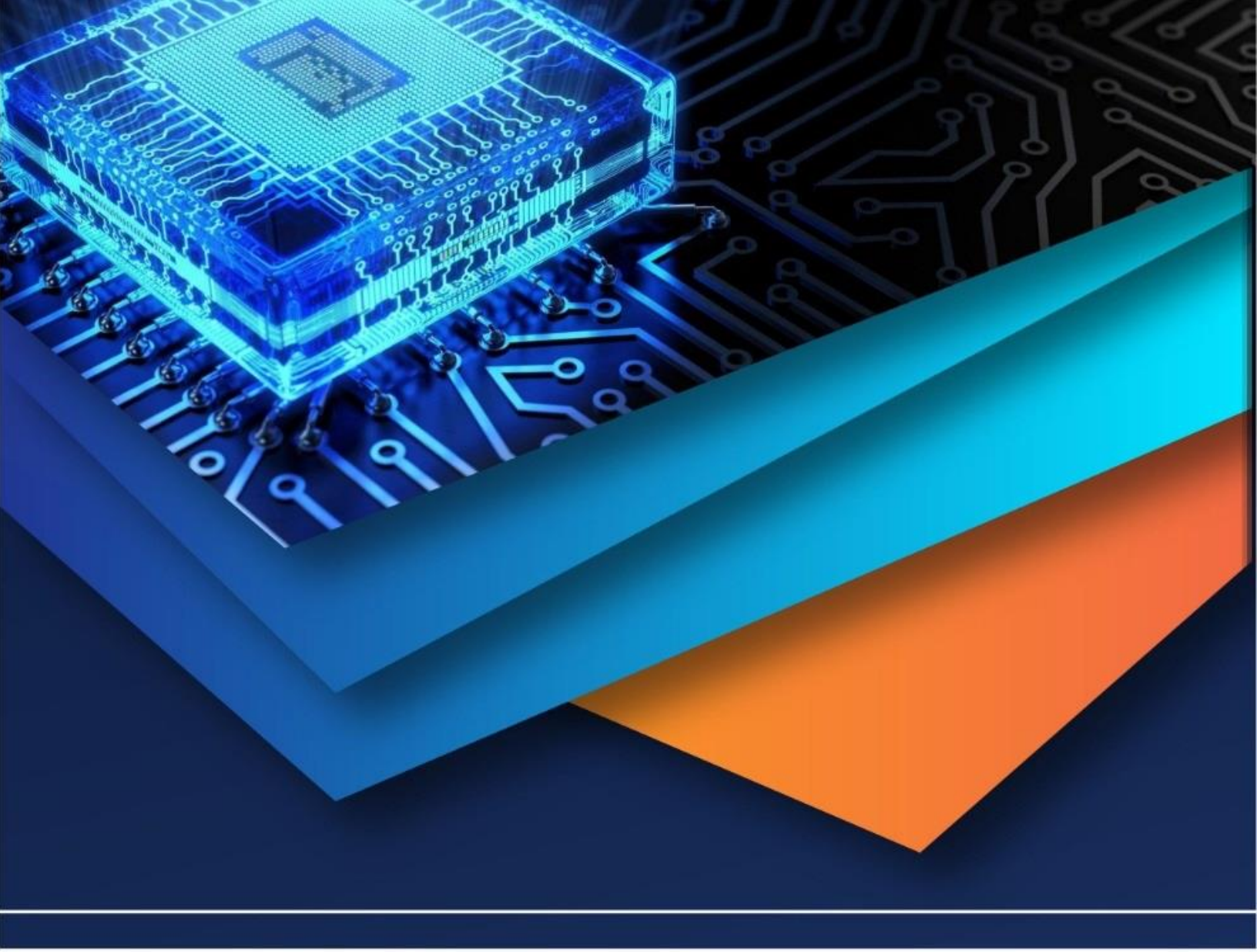
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