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Face Mask Detection Using Python

Vaishali S Rajput, Sejal S Jagtap, Rahul B Jagtap, Makarand P Jagadale, Sahil V Jagtap, Jagdeep Singh, Shreyash B Jagtap

Department of Engineering, Sciences and Humanities (DESH) Vishwakarma Institute of Technology, Pune, 411037, Maharashtra, India

***Abstract* —** Healthcare is experiencing a global emergency due to the COVID-19 epidemic. The major way that this virus spreads and offers a risk to others is through droplets that come from a person who has been infected with coronavirus. According to the World Health Organization, using a face mask in public places is one of the greatest strategies to avoid contracting an infection. In this project, we offer a technique to identify face masks on humans using TensorFlow and OpenCV. A bounding box above the subject's face indicates whether or not a mask is being worn. It can recognise a face and a mask moving together as a surveillance task performance.

***Keywords* —** *face mask, keras, opencv, python, tensorflow.*

I. INTRODUCTION

Human lives were significantly impacted by COVID-19. More than 20 million people worldwide have been afflicted with coronavirus disease 2019, according to the World Health Organization's Official Situation Report - 205. roughly 0.7 million deaths as a result.

Face mask detection entails locating the face and then assessing whether or not it is covered by a mask. In order to achieve the aforementioned goal, this paper offers a streamlined method that makes use of fundamental machine learning tools including TensorFlow, Keras, and OpenCV.

The innovative contribution made in this research will aid in the fight against the epidemic. Because they are unable to work or move around as usual without protection against COVID-19, it is important to identify those using masks. The suggested method successfully recognises the face in the image and then determines whether or not it is covered by a mask. The technique has a 97.1% accuracy rate.

Face mask detection involves both localizing faces and identifying mask wearing states, which we describe as not wearing a mask and wearing a mask generally. We further divided the mask-wearing states into correct and inappropriate states in accordance with healthcare standards. Face mask detection shares several characteristics with face detection in that localizing the face is an important subtask.

The issue is strongly related to broad object detection, in which every state can be thought of as a separate class. The difficulties in face mask identification include a wide range of in-the-wild scenarios with complicated backgrounds, confused faces without masks where faces may be hidden by other objects, a wide range of mask kinds with diverse shapes and colors, and incorrect mask wearing circumstances.

Related Work

In [2] The authors have created a method to determine how someone is using a face mask. They were able to categorize three types of facemask usage, including wearing a face mask correctly, wearing a face mask incorrectly, and not wearing a face mask. This technique had a detection accuracy of over 98%.

In [3]The researchers suggested an approach based on Mask R-CNN called Generalized Intersection over Union (GIoU) for face detection. By correctly identifying the face in place of the bounding box, which adds noise to the features of the face and decreases the accuracy of detection, they developed this way to lessen background noise.

I. METHODOLOGY/EXPERIMENTAL

A. Components:

A. TensorFlow

TensorFlow is an interface for expressing gadget gaining knowledge of algorithms, is applied for enforcing ML structures into fabrication over a gaggle of regions of pc science, inclusive of sentiment analysis, voice recognition, geographic statistics extraction, pc vision, textual content summarization, statistics retrieval, computational drug discovery and flaw detection to pursue research. The proposed version makes use of TensorFlow at backend.

B. Keras

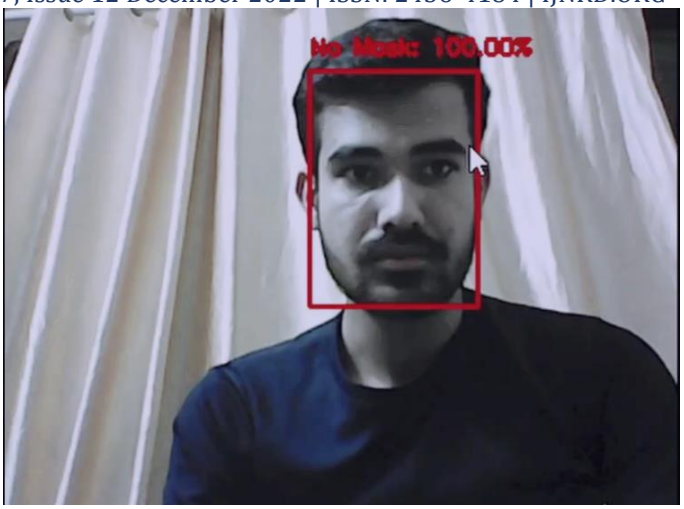
Keras offers essential reflections and constructing gadgets for advent and transportation of ML preparations with excessive generation velocity. It takes complete advantage of the scalability and cross-platform competencies of TensorFlow. The center statistics systems of Keras are layers and models. All the layers used withinside the CNN version are carried out the use of Keras. Along with the conversion of the magnificence vector to the binary magnificence matrix in statistics processing, it enables assembly of the general version.

C. OpenCV

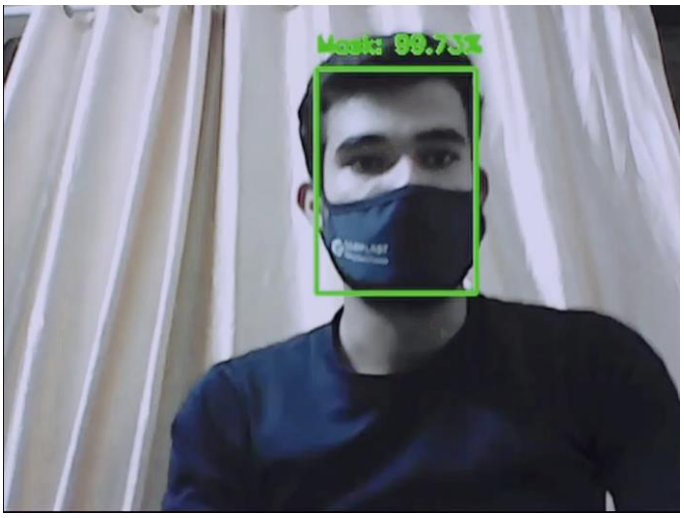
OpenCV (Open Source Computer Vision Library), an open supply laptop imaginative and prescient and ML software program library, is applied to distinguish and apprehend faces, apprehend objects, organization moves in recordings, hint revolutionary modules, observe eye gesture, song digital digicam actions, expel pink eyes from photographs taken utilizing flash, locate comparative photographs from an picture database, understand panorama and installation markers to overlay it with multiplied truth and so forth. The proposed technique uses those capabilities of OpenCV in resizing conversion of information images.

II. RESULTS AND DISCUSSIONS

The model is trained, valid and tested. the strategy attains accuracy up to ninety seven.1%. The optimized filter values and pool size facilitate filtration of the most portion (face) of the image to find the existence of the mask properly while not inflicting over- fitting. The system will with efficiency find partly occluded faces either with a mask or hair or hand. It considers the occlusion degree of 4 regions – nose, mouth, chin ANd eye to differentiate between an annotated mask or face coated by hand. Therefore, a mask covering the face totally together with



1.Person Without Mask



2.Person With Mask

The nose and chin can solely be treated as "with mask" by the model. The most challenges visaged by the tactic primarily consist of varied angles and lack of clarity. shadowy moving faces within the video stream create it tougher. However, following the trajectories of many frames of the video helps to form an improved call – "with mask" or "without mask".

III. FUTURE SCOPE

Face mask detection can be used for various purposes like for protection from pollution in public places and face mask detection can be used in companies or factories which has to deal with harsh odor chemicals. This system can be employed in public places like railway stations and malls. It will be of great help in companies and huge establishments where there will be a lot of workers. If a person's face is kept in the database, it can identify their name when they are not donning a face mask, and an email will be sent to that person alerting them to the situation so they can take appropriate safety measures.

IV. CONCLUSION

With the increasing number of COVID cases worldwide, a system to replace humans to check masks on the faces of people is greatly demanded.

This system satisfies that need. It helps in a number of operations. Wearing a mask may be obligatory in the near future, considering the Covid- 19 extremity. numerous public service providers will ask the guests to wear masks rightly to mileage of their services. The stationed model will contribute immensely to the public health care system. In future it can be extended to describe if a person is wearing the mask duly or not. The model can be further better to describe if the mask is contagion prone or not i.e.we classify the mask into two categories one of is surgical and others is Not.

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