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Face Mask Detection System Application

Anuj Sharma, Shiva Baliyan, Manish Sharma, Dr. Mohd Shariq, Jabir Ali

School of Engineering and Technology,Department of Computer Science and Engineering, ShardaUniversity,GreaterNoida,UP,India
School of Engineering and Technology, Department of Computer Science and Engineering, Sharda University, Greater Noida, UP, India
School of Engineering and Technology, Department of Computer Science and Engineering, Sharda University, Greater Noida, UP, India

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ABSTRACT:
COVID- 19 epidemic has fleetly affected our day-to- day life dismembering the world trade and movements. Also, the adding air pollution and day by day adding pollution affiliated complaint had also increased the need of wearing face mask to cover ourselves. Wearing a defensive face mask has come a new normal. In the near future, numerouspublic service providers will ask the guests to wear masks rightly to mileage of their services. thus, face mask discovery has come a pivotal task to help global society. This paper presents a simplified approach to achieve this purpose using some introductoryMachine Learning packages like TensorFlow ,Keres, OpenCV and Scikit- Learn. The proposed system detects the face from the image rightly and also identifies if it has a mask on it or not. As a surveillance task pantomime, it can also descry a face along with a mask in stir. The system attains delicacy up to95.77 and94.58 independently on two different datasets. We explore optimized values of parameters using the successional Convolutional Neural Network model to descry the presence of masks rightly without causingover-fitting.

I. INTRODUCTION

According to the World Health Organization(WHO)'s sanctioned Situation Report – 205, coronavirus complaint 2019(COVID- 19) has encyclopedically infected over million people causing over0.7 million deaths. individualities with COVID- 19 have had a wide compass of symptoms reported – going from mellow instantiations to serious illness. Respiratory and other lungs related problems caused from pollution patches like briefness of breath or difficulty in breathing were also adding day – by- day. Elder people having lung complaint can retain serious complications from COVID- 19 illness as they appear to be at advanced threat. Some common mortal coronaviruses that infect public around the world are 229E, HKU1, OC43, and NL63. Before enervating individualities, contagions like 2019- nCoV, SARS- CoV, and MERS- CoV infect creatures and evolve to mortal coronaviruses. Persons having respiratory problems can expose anyone(who is in close contact with them) to pestilent globules. Surroundings of a alloyed existent can beget contact transmission as driblets carrying contagion may withal arrive on his conterminous shells. To check certain respiratory viral affections, including COVID- 19, wearing a clinical mask is veritably necessary. The public should be apprehensive of whether to put on the mask for source control or aversion of COVID- 19. Implicit points of interest of the application of masks lie in reducing vulnerability of threat from noxious existent during the"pre-symptomatic" period and stigmatization of separate persons putting on masks to restraint the spread of contagion. WHO stresses on prioritizing medical masks and respirators for health care sidekicks. thus, face mask discovery has come a pivotal task in present global society.

II. RELATED WORK

In face discovery system, a face is detected from an image that has several attributes in it. According to, exploration into face discovery requires expression recognition, face shadowing, and pose estimation. Given a solitary image, the challenge is to identify the face from the picture. Face discovery is a delicate errand because the faces change in size, shape, colour, etc. and they are not inflexible. It becomes a laborious job for opaque image impeded by some other thing not defying camera, and so forth. Authors in think

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occlusive face discovery comes with two major challenges 1) Attainability of vastly substantial datasets containing both masked and unmasked faces 2) Rejection of facial expression in the covered area. exercising the locally direct embedding(LLE) algorithm and the wordbooks trained on an immensely colossal pool of masked faces, synthesized mundane faces, several misplaced expressions can be mended and the ascendance of facial cues can be eased to great extent. According to the work reported in, convolutional neuralnetwork(CNNs) in computer vision comes with a strict constraint regarding the size of the input image. The current practice reconfigures the images before fitting them into the network to master the inhibition. Then the main challenge of the task is to descrythe face from the image rightly and also identify if it has a mask on it or not. In order to perform surveillance tasks, the proposed system should also descry a face along with a mask in stir.

Dataset

Two datasets have been used for experimenting the current system. Dataset 1 consists of 1376 images in which 690 images with people wearing face masks and the rest 686 images with people who don't wear face masks. Fig.1 substantially contains frontal face pose with single face in the frame and with same type of mask having white colour only. Dataset 2 from Kaggle consists of 853 images and its countenances are clarified either with a mask or without a mask. Infig. 2 some face collections are head turn, cock and slant with multiple faces in the frame and different types of masks having different colours as well.

Incorporated Package

A TensorFlow

TensorFlow, an interface for expressing machine literacy algorithms, is employed for enforcing ML systems into fabrication over a bunch of areas of computer wisdom, including sentiment analysis, voice recognition, geographic information birth, computer vision, textbook summarization, information reclamation, computational medicine discovery and excrescence discovery to pursue exploration. In the proposed model, the whole successional CNN armature (Consists of several layers) uses TensorFlow at backend. It's also used to reshape the data(image) in the data processing.

B Keres

Keras gives abecedarian reflections and erecting units for creation and transportation of ML arrangements with high replication haste. It takes full advantage of the scalability andcross-platform capabilities of TensorFlow. The core data structures of Keras are layers and models. All the layers used in the CNN model is enforced using Keres. Along with the conversion of the class vector to the double class matrix in data processing, it helps to collect the overall model.

C OpenCV

OpenCV(Open Source Computer Vision Library), an open- source computer vision and ML software library, is employed to separate and fete faces, fete objects, group movements in recordings, trace progressive modules, follow eye gesture, track camera conduct, expel red eyes from filmland taken exercising flash, find relative filmland from an image database, perceive geography and set up labels to overlay it with increased reality and so forth. The proposed system makes use of these features of OpenCV in resizing and colour conversion of data image.

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Working

This project makes the use of OpenCV, Caffe- grounded face sensor, Keras, TensorFlow and MobileNetV2 for the discovery of face mask on humans. The dataset which is being used contains 3835 images out of which 1916 images have people with masks in them and 1919 people without masks in them. First a base model is generated. This is done by using Keras and MobileNetV2. First a base model is generated and a head model is generated on top of that. The head model consists of a network with 128 layers, an activation function of "Relu" and a powerhouse of0.5 followed by another network with 2 layers and an activation function "SoftMax". All these three layers combined, will give out model which will be trained. The generated model is also trained with the labelled dataset by unyoking it into two portions. One portion contains 75 percent images and it's used for training. The remaining portion contains the remaining 25percent of images and is used for testing the model delicacy. After the model is trained, it can be used for discovery of facemask on mortal faces. The trained model is loaded and image which contains mortal faces with or without masks or a nonstop videotape sluice with humans is given as input. The image or a frame of the videotape, in case the input is a videotape sluice, is first transferred to the dereliction face sensor module for the discovery of mortal faces. This is done by resizing the image or the videotape frame first, followed by detecting the blob in it. This detected blob is transferred to the face sensor model which labors only the cropped face of a person without the background. This face is given as the input to the model which we trained before. This labors rainfall there's a mask or not. Another model is trained with the faces of humans. The images used for the training of the model is handed with the name and dispatch address of that person as the markers of those images. This is done by using Open CV. When an input image is given to the CV model, it detects the face of a person and asks the stoner to give the name and dispatch address of that person which will be stored in the database. The affair of the first model is given as the input to this model. This face will be compared with the persons present in the database. And if his face matches, also a bounding box will be drawn over his face with his name on it and an dispatch and SMS will be transferred to him that he's not wearing a mask. Differently, only the words " Mask" will be present below the bounding box if the person is wearing a mask and " No Mask " if the person isn't wearing one.

III. RESULT AND DISCUSSION

The model is trained, validated and tested upon two datasets. Corresponding to dataset 1, the system attains delicacy up to95.77%. depicts how this optimized delicacy mitigates the cost of error. Dataset 2 is more protean than dataset 1 as it has multiple faces in the frame and different types of masks having different colours as well. thus, the model attains an delicacy of94.58 % on dataset 2. depicts the discrepancy between training and confirmation loss corresponding to dataset 2. One of the main reasons behind achieving this delicacy lies in MaxPooling. It provides rudimentary restatement invariance to the internal representation along with the reduction in the number of parameters the model has to learn. This sample grounded discretization process down- samples the input representation conforming of image, by reducing its dimensionality. Number of neurons has the optimized value of 64 which isn't too high. A much advanced number of neurons and pollutants can lead to worse performance. The optimized sludge values and pool size help to sludge out the main portion(face) of the image to descry the actuality of mask rightly without causingover-fitting.

IV. CONCLUSIONS

In this paper, we compactly explained the provocation of the work at first. also, we illustrated the literacy and performance task of the model. Using introductory ML tools and simplified ways the system has achieved nicely high delicacy. It can be used for a variety 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 them services. The stationed model will contribute immensely to the public healthcare system. In future it can be extended to descry if a person is wearing the mask duly or not. The model can be further bettered to descry if the mask is contagion prone or not i.e., the type of the mask is surgical, N95 or not.

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