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Real time face mask detection Using python

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ABSTRACT

Corona Virus or COVID-19 Disease is an infectious disease caused by newly discovered coronavirus. It caused a lot of damage to the Mankind around the world. It is also parallelly called as SARS-CoV-2 and was first reported in Wuhan City, China by the officials in December 2019. On 30 January 2020, the Director-General Tedros Adhanom of World Health Organization declared the outbreak of the coronavirus. Currently, many Pharma Companies aiming to develop vaccine to the COVID-19. To avoid being exposed to coronavirus, we must cover our nose and mouth with a mask, wash our hands frequently and avoid direct contact with the people who are already affected. This Paper aims to detect whether a person who is facing the camera is wearing a face mask or not in real time. Deep Learning is the best Technology present in the current Industry for its effectiveness in reorganization and classification using image processing. It proposes a retina face mask which a one stage detector and with further developments and modifications, this model can be used in Airports, Railway Stations and other highly crowed public areas.

Keywords- Real Time Face Mask detection, COVID-19, CNN, Deep Learning.

INTRODUCTION

Many people have been affected by COVID-19 across the world. It ruined the economic growth of almost every country across the world. As of now around 112 million people are infected by this virus and 63.2 million people recovered and 2.48 millionpeople are died because of this virus. The World Health Organization enforced some protocols to be followed in order to avoid infecting by the virus. Wearing a face mask, washing or sanitizing hands frequently using disinfectants and following strict social distancing rules are some of the protocols set by the World Health Organization. There are so many studies conducted that wearing a face mask is important in order to prevent the spread of COVID-19 [3]. Wearing N95 mask prevents virus transmission by 91% and surgical mask prevents virus transmission by 68%. Wearing these types of masks will reduce the spread of virus via air so that the virus cannot enter into the human respiratory system and it is also the cheapest available way to reduce respiratory infection disorders [4]. It is essential to develop an automatic detection for wearing face mask mainly in public areas which provides not only protection but also prevent the local pandemic [5,6]. Deep learning technology along with the combination of computer vision offers a number of developments in numerous fields of technologies.

Deep neural network which is a main component in Deep Learning offers Object Detection, Image processing and Image Segmentation. Convolutional Neural Networks (CNN's) is one of the important models of Deep Neural networks which is used in computervision tasks. Upon training the model, CNN's can identify and also classify facial Images even with minute differences using their overwhelming feature extraction ability and storeimage pattern details [7]. Deep Learning technique is used to construct a classifier which collects the images of a person wearing a face mask or not from the database and also differentiate between wearing facemask and not wearing a facemask [1]. We can create a classifier which classifies facial

images using CNN. CNN identifies images and categorizes them from a learned feature [2]. The data consists of two datasets which further contains images. The two datasets are with mask dataset and without mask dataset. The with mask dataset consists of a collection of images in which people wear mask and the without mask dataset consists of a collection of images in which people without mask. Technology around us emerges day by day, many technologies replicate the human brain by using mathematical calculations and formulas. Among them Artificial Intelligence is one of the best ways to implement this process. Artificial Neural Networks (ANN's) uses neurons and linked networks and implement mathematical equations[9,10,11,12].

The Artificial Neural Networks (ANN's) value should be learned using the supervised Machine Learning. The development of mainstream Artificial Neural Networks (ANN's) is implemented by Convolutional Neural Networks (CNN's). One of the key characteristics of Artificial Neural Networks is that it uses a technique called layering to reduce the number of neurons needed. One of the main deep learning processes is Convolutional Neural Networks (CNN) which gives a variety of applications for image-based applications and computer vision. It is also the best technique for Face Recognition, Image Recognition and Image Classification. Fig 1 and Fig 2 are the images of persons wearing mask and without mask[13,14].

Fig 1 ImagesofpersonswearingFacemask

Fig 2 Imagesofpersonswithoutwearingfacemask

LITERATURESURVEY

Face Recognition received a significant recognitionin the field of image processing, object detectionespecially in the recent years when the technology ismore emerging a lot across the world [8]. Although thepresentMachineLearningtechniqueshavereachedacertain height in recognition facial information, theirsuccess is limited by the conditions imposed by reallife situations. The current systems did not have thecapability of the human system. They are far awayfrom thehumanperceptionsystem.This research contains a set of process or steps whichinclude data collection, training, data analysis anddatainterpretation.Fordatacollection,varioussources like websites, journals etc are referred. GitHub and Kaggle datasets are taken and appliedvarious Machine Learning algorithms for datamanipulation and data visualization. Thecollected video frames are trained by using deep learningtechniques as it gives a very fast results by trainingmultipletimes.

PROPOSEDSYSTEM

Thissystem detectsapersonifhe/shewearing afacemask or not. It also detects weather a person covershis/her nose and mouth with a mask. This systemuses the computer's camera to detect the face andalsogivesthepercentage ofwhich howmuchthemask covers the face by a green color box around theface. It also gives the percentage of how much theface is not covering with a red color box around theface. It uses Retina Face Mask which is a highaccuracy and efficient mask detector. It includesvarious applications like Tensor Flow, Kera's, Open CV and Python. We should install all these applications into Python before using it. For installing all these applications , we will use command prompt. We also use command prompt forrunning all these commands. Finally, it works in realtimeby detectingweatheraperson iswearingafacemaskornot.Ifthecoloraround thefaceisgreen,he/she is wearing the mask or it the color around thefaceisred,he/she isnotwearingthemask. The proposed work flow diagram is shown in Fig 3.

- **Load Face Mask Dataset-** The first step of RealTime Face Mask Detection is loading face maskdatasetand without face mask dataset. Each data set consists of a collection of images.
- **Train Face Mask Classifier-** The images are pre-processed are further enhanced for image featuresduringprocessing.Theseimagesareusedfortrainingpurposesfor the algorithm.
- **Apply Face Mask Detector-** After the datasets areclassified,loadthefacemaskclassifierfromthedisk.Upon loading them, the algorithm will detect faces inimage/video stream.
- **Extraction-** ROI of all the faces will be extracted.Thenapplymaskclassifiertoeach faceROI.Thisistodeterminethefacecontaining maskornomask.

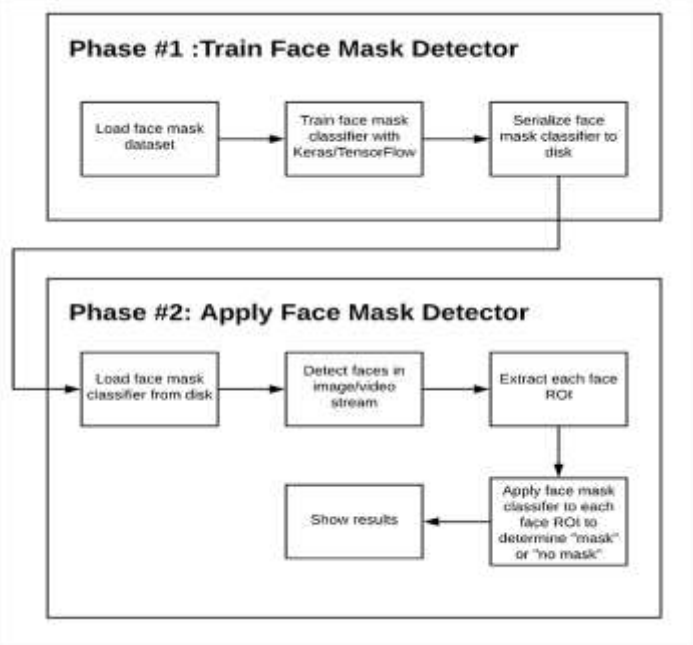

Fig 3 Work flow diagram

RESULTS

After compiling successfully, the camera pop-up willappear on the screen which shows the person's faceweather he/shewearing amaskornot.Toexitfromthecamera,type"Q"onthecamera. Toexitfrom theprocess, type "exit" command on the commandprompt. The results are shown in Fig 4 and Fig 5.

Fig 4 Personwearinga mask

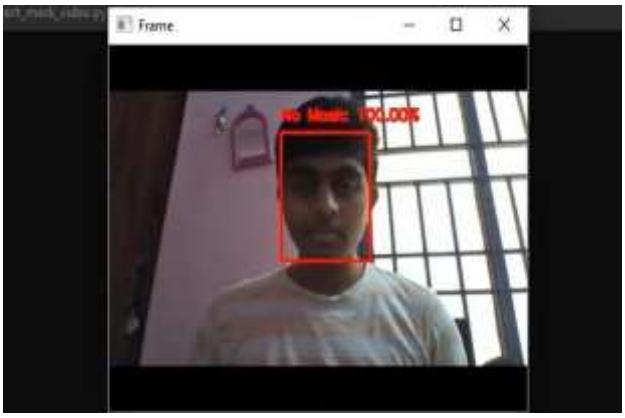

Fig 5 Personwithoutwearingamask

CONCLUSION AND FUTURE WORK

This paperwork represents the study of Real TimeFaceMaskDetection usingdeeplearningtechniquesand ConvolutionalNeuralNetworks(CNN).Thecurrent model uses OpenCV, Python and CNN todetect the people wearing mask or without maskusing a live video stream. Although the accuracy ofthissystem is80%furtherdevelopmentof thismethod can result high accuracy and consistent. Mostdeep learning tutorials won't teach you how to dealwith your own dataset. But this method will allowyou to learn with your own dataset. This techniquenot only allows you learn with state-of-the-artarchitecture but also gives you an idea of how tocreate your own Convolutional Neural Network(CNN).

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