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TRAINING CERTIFICATE

ABSTRACT

After a rapid spread of Coronavirus (COVID – 19) in Wuhan –China in December 2019 ,World Health Organization (WHO) confirmed that this was a dangerous virus that could spread from person to person through droplets and airborne contaminants. To prevent the spread of Covid19,people should wear mask during this pandemic. Many new models are developed utilizing convolutional Neural Network to build a model as accurately as possible . The method proposed in this project uses the ResNet model to obtain multiple faces with a single (SSD – Single Shot Multibox Detector) image using a network (model) and MobileNetV2 Architecture used as face mask detector. This system should be used in Real-time applications which require face mask detection for safety purpose due to the outbreak of Covid-19.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Introduction :

Corona Virus (COVID19) has caused a great deal of damage worldwide. At First corona virus identified in WUHAN - CHINA in December 2019, the World Health Organization (WHO) initially declared this disease as a corona virus outbreak and later declared it an epidemic. [1] Globally, as of now 15 September 2021, there were 225,680,021 confirmed Cases and 4,644,740 people died due to Covid-19 reported by WHO. The Corona virus has been transmitted from one person to another in a variety of ways. The disease spreads to a non-infected person when an infected person coughs or sneezes at some point. The only way to prevent the spread of corona infection is to keep the community distance and to wear face masks. But people do not take this seriously and roam the streets without wearing the right mask and not following proper safety procedures. Physically, it is difficult to keep track of a large number of people in public places. It is therefore important to create a software that can automatically identify people, whether they are wearing a mask or not wearing a mask. Face detection is a technology used to detect human faces in digital images over a long period of time. Using this technology, we can create a model for getting a face mask detection. In this paper, the face mask detection model has been developed using ResNet (SSD), OpenCV, Tensorflow, keras and MobileNetV2 architecture. This model is based on SSD (Single shot Multibox detector) and Resnet-10 architecture as the backbone. We use the Resnet (SSD) model to identify the face while the MobilenetV2 architecture is used to identify the object detection which is the mask detection. Here on this paper Resnet (SSD) [2] and MobileNetV2 models are used in combination to get the highest accuracy face mask detection model. This Algorithm provides more accuracy than other face mask detection algorithms like LeNet-5, AlexNet, YoloV4 etc. The dataset used for this program contains 7553 images which are provided by Kaggle. This model can also be used in the Realtime application to monitor peoples in public places. This system should be used in public places such as school, airport, railway stations etc. By using this system, it is easy to control people and helps to reduce active cases of

coronavirus. The rest of this paper is structured as follows;The second section describes the corresponding activities performed similarly to this paper in the name of Related Works.Section Three describes the methodology and implementation of this system. In the fourth phase the experimental results will be shared with the extracted images and the fifth phase concludes with the conclusion and references.

Related Works :

This section describes the related works which are done previously in this field. There are many models are used to develop Face mask detection system. Here the list of some [4][5][6][7][8][9][10][13][14] models which are discussed below. Author Mohamed LakhdarMokeddem et al. [3]Developed the face mask detection system using YOLOV4 model, which is similar to SSD model. Yolov4 is a high precision model and single-stage object detection algorithm which is proposed in 2020. In this paper, the dataset is divided into three classes 1.wider face 2.FMD 3.RMFD contains 14409 images. This model gives results of average precision for 416*416 is 83% and precision equal to 86.29 with input 512*512 and precision equal to 88.82 with input size 608*608 which is less than our proposed model. Author J. R. V. Jeny et al.[4]Developed a face mask detector using MTCNN model. The datasets used in this paper contain 1139 images in which 659 images are with mask and remaining 480 are without mask images, which are trained and tested. As a result, this model gives F1 score as 0.91 whereas our proposed model gives 0.99 F1 scores as a result. so our model is slightly more accurate than this model In this paper [5]The author T. Q. Vinh et al. used Yolov3 algorithm and haar cascade detector to detect the face. This algorithm was developed by Joseph Redmon et al. in the year 2018.This model has proven to be effective in object detection and vehicle detection systems. The dataset consists of 7000 images provided by MAFA. This model achieves an accuracy of 90.1 in the training of dataset In this paper [6]The author Mittal et al. developed a lightweight convolutional neural network-based model to achieve a comparable accuracy with different models developed in the past. The author uses the YoloV3 model to train the

dataset. The dataset contains 494,414 sample images. This deep CNN based mask detection achieved 97.7% accuracy. In this paper [7]The author J. Ieamsaard et al. developed the face mask detection system using deep learning model using YoloV5 algorithm. The experimental results for this face mask detection system obtained from the deep learning models with different epochs, including 20,50,100,300,500. The dataset used in this model contains 853 images. Each image has different sizes, its label and bounding boxes are assembled in the PASCAL VOC format. The deep learning model for the face mask detection system has good performance with the accuracy of 96.5% with 300 Epochs. In this paper [8] The Author developed a transfer learning model to automate the process of detecting the mask in the face of human beings. The author developed this model using pre-trained deep learning model. This mask detection system is trained with Simulated Masked Face Dataset (SMFD). The transfer learning of InceptionV3 model achieved 99% accuracy in the training phase. In this paper [9] the author developed a combination of light weight neural network MobilenetV2 and single shot detector to achieve the balance of resource limitations and better accuracy. The dataset which is used to train the model consists of 3165 images. This system achieves 91.7% of precision score and 0.91 of recall values with FPA=28.07. In This paper [10] the author developed a face mask detection system using ResNet-101 and raspberry bi board. This model consists of two key components, One is deep transfer learning ResNet-101 as a feature extractor and the second one is a basic machine learning decision tree. This model is trained using 1570 images and achieves 96.02% of precision score.

III. PROPOSED WORK

This model is developed using Keras, TensorFlow, ResNet(SSD), MobilenetV2 and OpenCV. At first to detect the face from the given input we are using Resnet-10 which is single-shot Multibox detector(SSD) [2]. It is capable of detecting faces from Real-time video or from any images with high rate of accuracy. To obtain accurate result pretrained Resnet Caffe models are used in this system. MobileNetV2 architecture is used to detect the face and mask from a video stream. It is used to acquire faster and accurate detection of mask from the video stream. Using MobilenetV2, the base model has been created to access the imagenet which is pre-trained model to obtain better results.

A. Dataset Description

Dataset plays an important role in order to get better accuracy in the proposed model. The dataset used in this model collected from Kaggle platform. FACE MASK DETECTION DATASET [11] is the name of collected dataset from Kaggle. This dataset consists of 7553 images in total divided into 2 categories 1.With mask contains 3725 images 2. Without mask contains 3828 images. This dataset will undergo preprocessing, training and testing to acquire a better result.

TABLE III. COMPARISON BETWEEN DIFFERENT ARCHITECTURES

SI.NO	Comparison of Accuracy and F1-Score for Different Architectures			
	Architecture Used	Year	Accuracy	F1-Score
1	LeNet-5	1998	84.6	0.85
2	Alex Net	2012	89.2	0.88
3	YoloV3	2016	92.7	0.31
4	SSD and MobileNetV2 (proposed Model)	2021	99.1	0.99

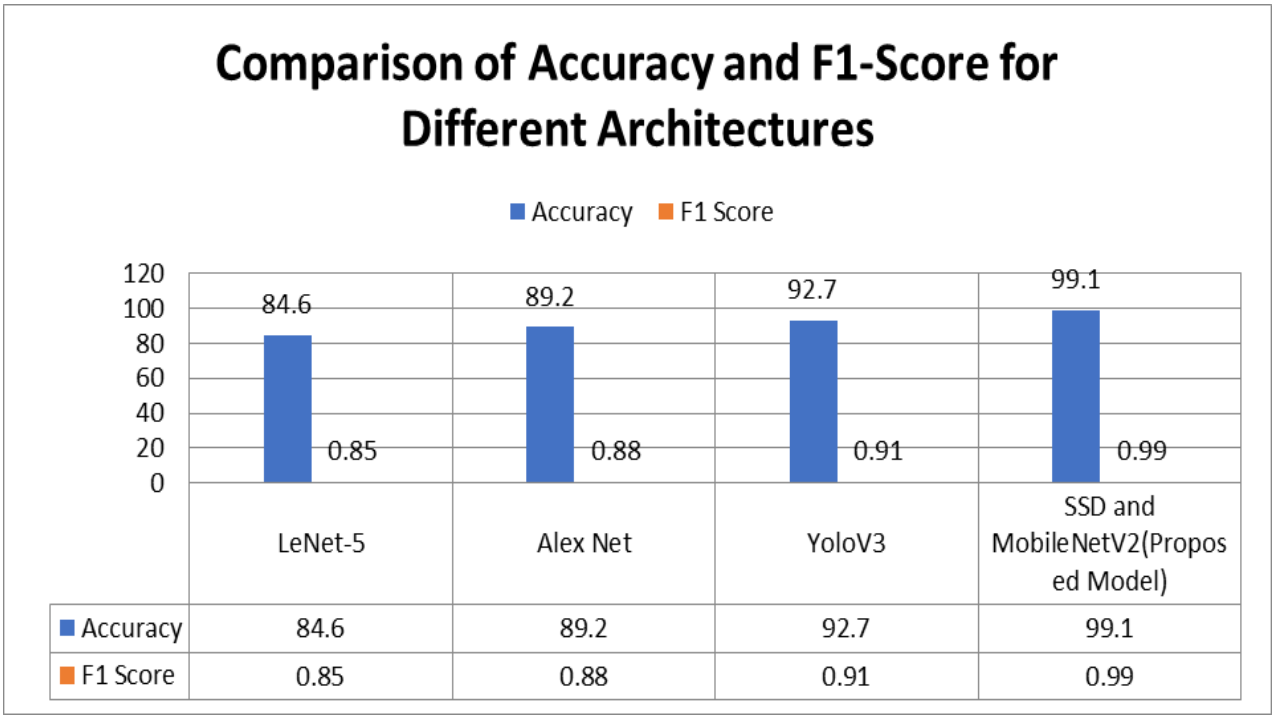

Fig.3.6. Graphical Representation of Table 3