Journal of Advanced Research in Technology and Management Sciences (JARTMS)
Volume: 03 Issue: 04 ISSN: 2582-3078 July 2021
Available online at: http:// www.jartms.org

REAL-TIME FACE MASK PREDICTION AND BODY TEMPERATURE IDENTIFICATION

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Abstract : COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society. This paper presents a simplified approach to achieve this purpose using some basic Machine Learning packages like Tensor Flow, Keras, OpenCV and Scikit-Learn. The proposed method detects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion. The method attains accuracy up to 95.77% and 94.58% respectively on two different datasets. We explore optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

Keywords: Masked face detection,Facemask classification and recognition.

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1. INTRODUCTION

According to the World Health Organization (WHO)'s official Situation Report – 205, coronavirus disease 2019 (COVID-19) has globally infected over 20 million people causing over 0.7million deaths. Individuals with COVID-19 have had a wide scope of symptoms reported – going from mellow manifestations to serious illness. The public should be aware of whether to put on the mask for source control or aversion of COVID-19. Potential points of interest of the utilization of masks lie in reducing vulnerability of risk from a noxious individual during the "pre-symptomatic" period and stigmatization of discrete persons putting on masks to restraint the spread of virus. WHO stresses on prioritizing medical masks and respirators for health care assistants.Therefore, face mask detection has become a crucial task in present global society. Face mask detection involves in detecting the location of the face and then determining whether it has a mask on it or not. The issue is proximately cognate to general object detection to detect the classes of objects. Face identification categorically deals with distinguishing a specific group of entities i.e. Face. It has numerous applications, such as autonomous driving, education, surveillance, and so on .This paper presents a simplified approach to serve the above purpose using the basic Machine Learning (ML) packages such as TensorFlow, Keras, OpenCV and Scikit-Learn. The rest of the paper is organized as follows: explores related work associated with face mask detection. discusses the nature of the used dataset. presents the details of the packages incorporated to build the proposed model. It gives an overview of our method. Experimental results and analysis are reported in concludes and draws the line towards future works.

2. DESIGN

CNN plays an important role in computer vision related pattern recognition tasks, because of its superior spatial feature extraction capability and less computation cost . One of its very useful applications is a binary classification of images. CNN uses convolution kernels to convolve with the original images or feature maps to extract higher-level features. However, how to design better Convolutional neural network architectures remains an opening question. Inception network is one of the most widely used and accepted convolutional neural networks proposed. It allows the network to learn the best combination of kernels. In order to train much deeper neural networks, Residual Network (ResNet) was proposed, which can learn an identity mapping from the previous layer.

Our Project is divided into two modules:

Facemask Detection Module: A Facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces typically employed to authenticate users to id verification services, works by pinpointing and measuring facial features from a given image. Face detection just means that a system is able to identify that there is a human face present in an image or video. Mask Net is used to identify whether a person is wearing a mask or not. MobilenetV2 is similar to face net but the main difference is face net processes are very slow and whereas mobile net can be implemented even on lowest storage devices and even mobile devices as well.

Body Temperature Identification: In this module the main aim is to check each and every individual body temperature in the public places. Without mutual contact and through sensor temperature can be measured. If the temperature is higher than usual body temperature then that individual will be quarantined.

3.RESULTS AND ANALYSIS

The model is trained, validated and tested upon two datasets. Corresponding to dataset 1, the method attains accuracy up to 95.77% . depicts how this optimized accuracy mitigates the cost of error. Dataset 2 is more versatile than dataset 1 as it has multiple faces in the frame and different types of masks depicting the contrast between training and validation loss corresponding to dataset 2. One of the main reasons behind achieving this accuracy lies in *MaxPooling*. It provides rudimentary translation invariance to the internal representation along with the reduction in the number of parameters the model has to learn. This sample-based discretization process down-samples the input representation consisting of image, by reducing its dimensionality. Number of neurons has the optimized value of 64 which is not too high. A much higher number of neurons and filters can lead to worse performance. The optimized filter values and pool_size help to filter out the main portion (face) of the image to detect the existence of the mask correctly without causing over-fitting.

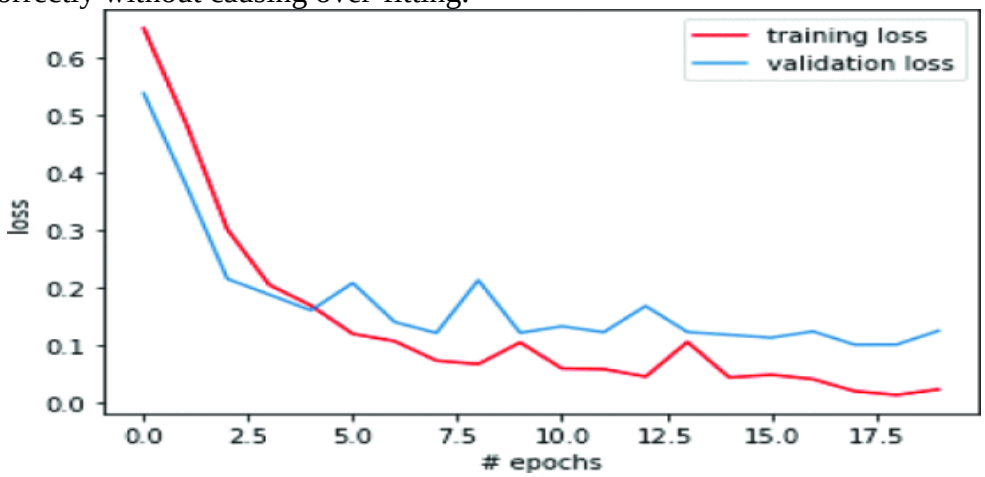

Fig. Epochs vs loss corresponding to dataset 1

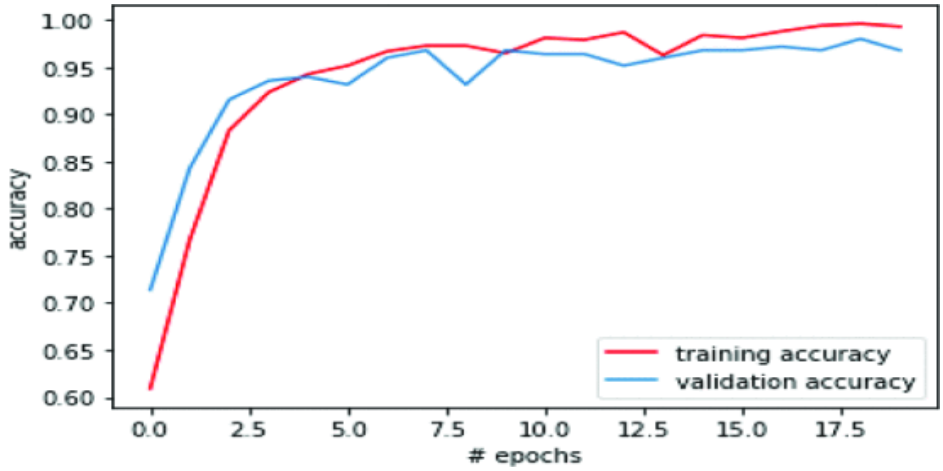

Fig. Epochs vs accuracy corresponding to dataset 1

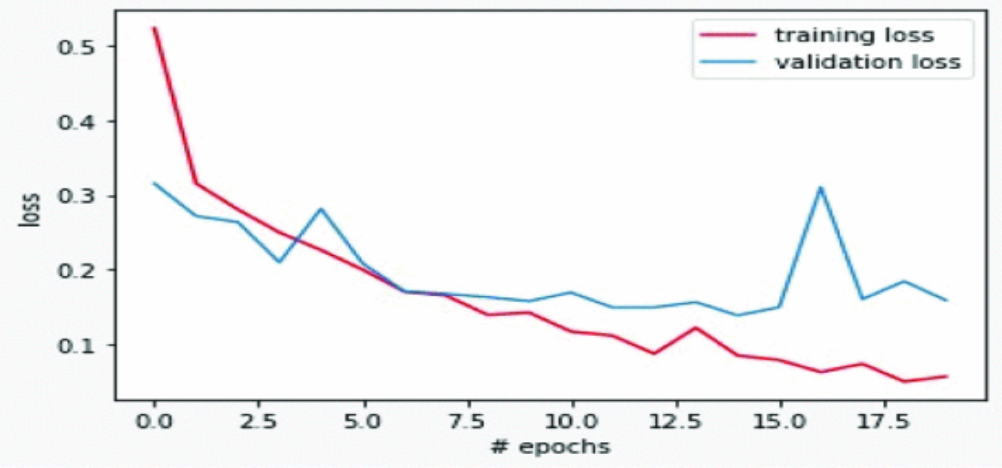

Fig. Epochs vs loss corresponding to dataset 2

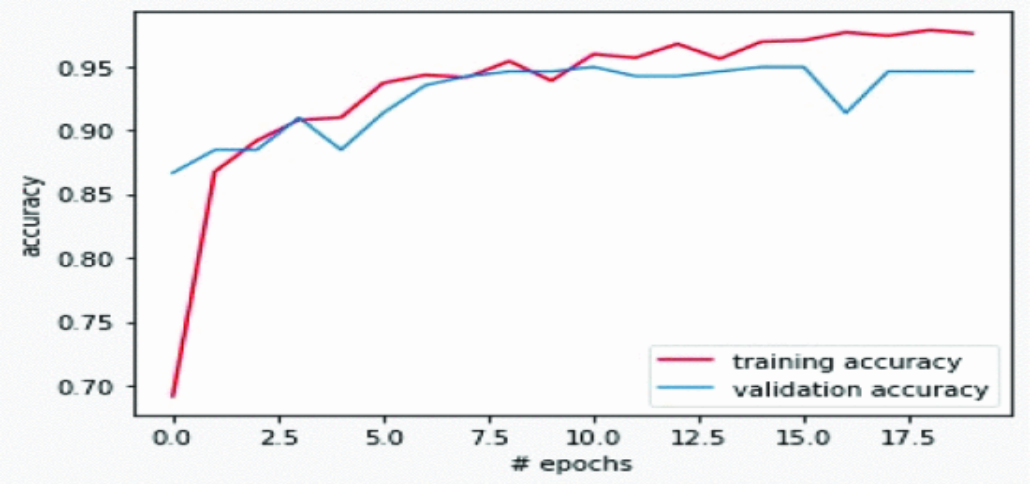

Fig:Epochs vs accuracy corresponding to dataset 2

4.CONCLUSION

In this paper, we briefly explained the motivation of the work at first. Then, we illustrated the learning and performance task of the model. Using basic ML tools and simplified techniques the has achieved variety of applications. Wearing a mask may be obligatory in the near future, considering the Covid-19 crisis. Many public service providers will ask the customers to wear masks correctly to avail of their services. The deployed model will contribute immensely to the public health care system. In future it can be extended to detect if a person is wearing the mask properly or not. The model can be further improved to detect if the mask is virus prone or not i.eThe type of the mask is surgical, N95 or not.

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