Performance Evaluation of Intelligent Face Mask Detection System with various Deep Learning Classifiers

This study shows the use of deep learning methods to identify people who do not wear masks. The purpose of this study is to identify violators who do not wear masks to prevent the spread of the virus. In the COVID-19 epidemic, the World Health Organization (WHO) has announced the wearing of masks to prevent the spread of the virus. The motivation of this research is to identify accurately whether a person is wearing a mask or not. When the algorithm identifies a person without a mask, an alarm should be generated to alert the people around or the concerned authorities nearby, so that necessary actions can be taken against such violators. This system aims to categorize whether a person is wearing a mask with input from images and real-time streaming videos.

This research paper evaluated different classifiers, including different optimizers, to come up with a system for large-scale applications. This paper compares Optimizer ADAM, ADGRAD, and SGD with classifieds like Mobile NetV2, RSNET50, VGG16. The system has been worked with these classifiers. MobileNetV2 classifier uses Depth wise Separable Convolution which is introduced to dramatically reduce the complexity cost and model size of the network and hence is suitable to Mobile devices, or devices that have low computational power. The study found that the best performance was achieved by placing MobileNetV2 as the backbone for feature extraction, object detection, and semantic segmentation. RESNET introduced the skip connection concept in this system. VGG16 is a CNN architecture that is considered to be one of the excellent vision models to date in this research. The paper highlights that the most unique thing about VGG16 is that instead of having a large number of hyper-parameter they focused on having convolution layers of 3x3 filters with a stride 1. The researchers said that it follows this arrangement of convolution and max pool layers consistently throughout the whole architecture. The 16 in VGG16 refers to 16 layers that have weights. In SGD, the research uses only a single sample. The sample is randomly shuffled and selected for performing the iteration. In this study the researchers use only one sample from the dataset is chosen at random for each

iteration, the path taken by the algorithm to reach the minima is usually noisier than their typical Gradient Descent algorithm.

From this study, it has been observed that the performance of the ADAM Optimizer is better in terms of training and testing compared to the other two optimizers ADGRAD and SGD. Also found that the other two optimizers ADGRAD and SGD and accuracy in all tests and the relatively good performance training and test both Optimizer. From the results of various classifications in this research, it has been observed that the performance of ADAM Optimizer is very good and the accuracy of the SGD test is almost equivalent to the above 3 classifications Adam is tested.

In this paper, the current system is evaluated with different classifications but interfacing with alarm and warning systems is not implemented in their systems. This system can be integrated with a system that applies social distance to a system that can make it a healthier system that can have a dramatic effect on the spread.

This research paper will help us to complete our project a lot. Because in our project we are going to build a system wherein different institutions, in the workplace, at the entrance to the school or college it is possible to identify whether someone is wearing a mask or not. In this research, they used some classifiers which will be beneficial for us to implement our system.

Paper link: http://sersc.org/journals/index.php/IJAST/article/view/23805

COVID-19 Facemask Detection with Deep Learning and Computer Vision

The purpose of this research paper is to create a safe environment in a manufacturing setup using AI and built a hybrid model using deep and classical machine learning for face mask detection. In their study, the Face Mask Identification dataset was made up of masks with and without mask images, they used OpenCV to detect real-time faces from a live stream via their webcam. Using Python, OpenCV, and Tensor Flow, and Keras, researchers used datasets to create a COVID-19 face mask identifier with computer vision. Their goal in this study is to identify whether the person in the image/video stream is wearing a face mask or not with the help of computer vision and deep learning. In this paper, a mask face detection model is introduced which is based on a computer approach and deep learning. The proposed model could be integrated with surveillance cameras to prevent COVD-19 infection by identifying non-masked individuals.

The system proposed in this study focuses on how to identify people wearing Facebook/video streams using computer vision and deep learning algorithms using OpenCV, Tensor Flow, Keras, and Pieterch libraries. They use two approaches firstly they trained the deep learning model by MobileNetV2, secondly, they applied mask detector over images / live video stream. From their data source, it is found that most of the images were added by OpenCV. The set of images was already labeled "Mask" and "No Mask". The images present were of different sizes and resolutions, probably taken from different sources or machines (cameras) of different resolutions. Then they preprocessed the data before using it. Tensor Flow, Keras, PyTorch, Caffee, MxNet, Microsoft Cognitive Tool Kit these deep learning frameworks are used. A pre-trained model provided by the OpenCV framework was used to detect faces. The model was trained using web images. OpenCV provides 2 models for this face detector: one is the floating-point 16 version of the main cafe implementation and the other is the 8 bit quantified version using tensor flow.

They use transfer learning to gain weight from similar task face detection, looking for more powerful features in their study, training on a very large dataset. They used OpenCV, Tensor Flow, Keras, PyTorch, and CNN to find out if people were

wearing masks. The models mentioned in their paper were tested with images and real-time video streams. The accuracy of the model is achieved and, optimization of the model is a continuous process and they have created a highly accurate solution by harmonizing the hyperparameters.

The model mentioned in their research paper has only been identified by wearing a mask through a picture of a person. There is no mention of capturing videos in their models. Other models that identify masks not only use images but also video stream to detect masks. Sometimes it difficult to find whether a person wears a mask or not only by image, it needs to verify by seeing videos.

In our project, we are going to build a system wherein in different institutions, in the workplace, shopping malls, at the entrance to the school or college it is possible to identify whether someone is wearing a mask or not. In this study, they introduced a face mask detection model that is based on computer vision and deep learning. So this is relevant to our project and it is going to help us to implement our system also using machine learning algorithms, computer vision, and deep learning.

Paper link: https://www.irjet.net/archives/V7/i8/IRJET-V7I8530.pdf