FACE MASK DETECTION TEXT ALERT

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ABSTRACT

Mask-wearing is a basic figure halting the COVID-19 transmission. A Real-time face mask detection becomes an essential application to prevent the spread of pandemic. This paper present a face mask detection system that can detect and monitor mask-wearing from camera feeds and alert when there is a violation. With the increasing number of cases all over the world, a system to replace humans to check masks on the faces is necessary. This system satisfies that need. The main aim of this research paper is to create a face mask detection system using TensorFlow , Keras and OpenCV that identifies whether all people coming under any Closed-Circuit Television(CCTV) surveillance is wearing a face mask or not a person is wearing mask by monitoring a live text message. The dataset is trained with CNN(using keras and TensorFlow) with an accuracy using SVM . The term Haar Cascade Classifier is used to identify whether is wearing a mask or not through a image or live video. Mainly presenting a text system , the person gets a text message for not a mask. This facial covering discovery framework can be utilized at the entry of colleges, air terminals, inns, public structures, Railway Stations, or any significant spots enormous groups .Experimental results show that the sequential model performs well on the test data on checking open cv. The framework will be python and ML-based which will be safe and quick for implementation.

Key words: Covid19,Mask Detection,Alert System,CCTV,OpenCV

I.INTRODUCTION

The spread of covid is constantly increasing day by day. The recent published research on COVID19, every 10% increase in mask-wearing means a three fold likelihood of stopping the breakout in a community , and other policies, such as social distancing, are not near as effective [1]. Mandating the face mask thus is urgent and essential. .However enforcing the mandate by human force can be tedious since the task needs continuous focus and long hours which is dangerous as it increases the risk for the enforcer. Observing the global crisis, a new need for face mask identification has emerged. A face mask detector is an algorithm that detects the mask-wearing status of a person. Using a face mask detector can relieve human factors from the mask-wearing enforcing task [2]. One more utilization of the facial covering locator is for an incredible inverse reason. In some sensitive security zones where masking is prohibited, face mask detection can alert a masked person in the security footage [6]. The wide range of application of the face mask detector makes it a popular research . This paper presents an accurate face mask detection system using Machine Learning. And a popular Haar Cascade Classifier is used to detect in most orientations and provides lightweight and accurate predictions [3].The convolutional model is developed based on automatic recognition while the machine learning face mask detection technique is used for high speed and accurate detection and feature extraction in real-time environment.Testing of data is done using python libraries such as Open CV , TensorFlow, and

Keras to detect people who are not wearing a face mask by sounding alarm or sending email warning to police, authority, or an observer. This system allows them to see who isn't wearing mask on their faces.

II.OBJECTIVE

The main objective of this paper is to identify a person that he/she was not wearing a mask mainly focuses on sending text alerts to the faces which are recognized in the CCTV cameras combined with computer vision to detect the people without masks using support vector machine algorithm to detect the features of faces so that the trained model is identified with actual model using the real-time webcam .

III.RELATED WORKS

1.Md. Sabbir Ejaz, M.Islam, 2019 International Conference have laid the work on Masked face recognition using Convolutional Neural Network. Recognition from faces is apopular and significant technology in recent years.Face alterations and presence of face mask make it too challenging.When a person is uncooperative with the systems such s video surveillance then masking is further comman scenarios.For these masks, current face face recognition performance degrades.The primary concern to this work is about facial masks, and especially to enhance the recognition accuracy of different masked faces.A feasible approach has been proposed that consists of first detecting the facial regions. The occluded face detection problem has been approached using Multi-Task Cascaded Convolutional Neural Network(MTCNN).Then facial features extraction is performed using the Goggle Fcenet embedding model. And finally, the classification task has been performed by Support Vector Machine(SVM). Experiments signify that this mentioned approach gives remarkable performance has been also evaluated within excessive facial masks and found attractive outcomes [7]

2. P.Nagrath, etal, have proposed a real time DNN based face mask detection system using single shot multibox detector and MobileNetV2, using OpenCV Deep Neural Network(DNN),TensorFlow,Keras, and MobileNetV2 architecture which is used as an image classifier. OpenCV DNN used in SSDMNV2 contains SSD with ResNet-10 as backbone and is capable of detecting faces in most orientations.While MobileNetV2 used provides for lightweight and accurate predictions for classification based on whether a mask is worn or not.SSDMNV2 performs competently in differentiating images having frontal faces with masks from images having frontal faces without masks [9].

.3. Yeboah, D.etal, have proposed an paper on Image Classification using TensorFlow GPU , the emphasis is placed on synthesizing important advanced category strtergies and targeting strategies that can be used to improve ranking accuracy. The results show the eeficiency anad accuracy of deep learning-based image using the TensorFlow GPU. A research is done to identify and reduce uncertainities in the image processing chain to improve classification accuracy [13].

4. S.Gosh, N. Das and M.Nasipuri, have highlighted 25 techniques for reshaping inputs for convolutional neural network. Most convolutional neural networks are designed in a way so that they can only accept images of a fixed size. This creates several challenges during data acquisition and model deployment. The common practice to overcome this limitation is to reshape the input images so that they can be fed into networks.In this work we analysed 25 different reshaping method across 6 datasets corresponding to different domains trained on three famous architecture namely Inception-V3, ResNet 18 and DenseNet 121 architecture. In total, 450 neural networks were trained from scratch to provide various analyses regarding the convergence of the validation loss and the accuracy obtained on the test data. Statistical measures have been provided to demonstrate the dependence between parameter choices and datasets [11].

5. S. Ge, J. etal, has detected faced mask in the wild with LLE-CNN, Detecting faces with occlusions is a challenging task due to two main reasons: 1) the absence of large datasets of masked faces, and 2) the absence of facial cues from the masked regions. To address these two issues, this paper first introduces a dataset,

denoted as MAFA, with 30, 811 Internet images and 35, 806 masked faces. Faces in the dataset have various orientations and occlusion degrees, while at least one part of each face is occluded by mask. Based on this dataset, we further propose LLE-CNNs for masked face detection, which consist of three major modules. The Proposal module first combines two pre-trained CNNs to extract candidate facial regions from the input image and represent them with high dimensional descriptors. After that, the Embedding module is incorporated to turn such descriptors into a similarity-based descriptor by using locally linear embedding (LLE) algorithm and the dictionaries trained on a large pool of synthesized normal faces, masked faces and non-faces. In this manner, many missing facial cues can be largely recovered and the influences of noisy cues introduced by diversified masks can be greatly alleviated. Finally, the Verification module is incorporated to identify candidate facial regions and refine their positions by jointly performing the classification and regression tasks within a unified CNN. Experimental results on the MAFA dataset show that the proposed approach remarkably outperforms 6 state-of-the-arts by at least 15.6% [10].

IV.METHODOLOGY

A. HAAR Feature Based Classifier

Classifiers It is an Object Detection Algorithm used to identify faces in an image or a real time video. Dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy. It is an effective way for object detection. In this methodology, part of positive and negative pictures are utilized to prepare the classifier.In this, a model is pre-trained with frontal features is developed and used in this experiment to detect the faces in real-time.

B. Convolutional Neural Network

Convolutional neural network is a class of profound learning strategies which has become prevailing in different computer vision undertakings and is drawing in interest across an assortment of spaces, including radiology. The model in this paper uses convolutional network It takes the image data as input, captures all the data, and send to the layers of neurons. It has a fully connected layer, which processes the last output that represents the prediction about the image. The collected dataset, training the processed data using Convolutional Neural Network (CNN) model and also by using some Machine learning packages like KERAS, Tensor flow, and Open CV [4] . Finally, a real-time detection is finished and an alarm message is sent to the authorities by means of email in the event that an individual is distinguished not wearing a facial covering.

Support Vector Machine

A face recognition system in view of Support Vector Machine (SVM) which acts as a multiclass classifier. Support Vector Machines (SVMs) have been as of late proposed as another strategy for pattern recognition. They are supervised machine learning models that divide and classify data.SVMs are broadly utilized for applications like face detection, classification of pictures, handwriting recognition , and so on. A SVM model can be considered as a point space wherein various classes are separated using hyper planes. Using SVM algorithm, the model trained with the images present, so that it can learn and identify the features of it. Now, the classification is done by comparing actual images with the trained images with the help of support vectors, the system could identify the person with mask or no mask, if a person is not wearing a mask-he/she is alerted a text using smt P library.

V. SYSTEM ARCHITECTURE

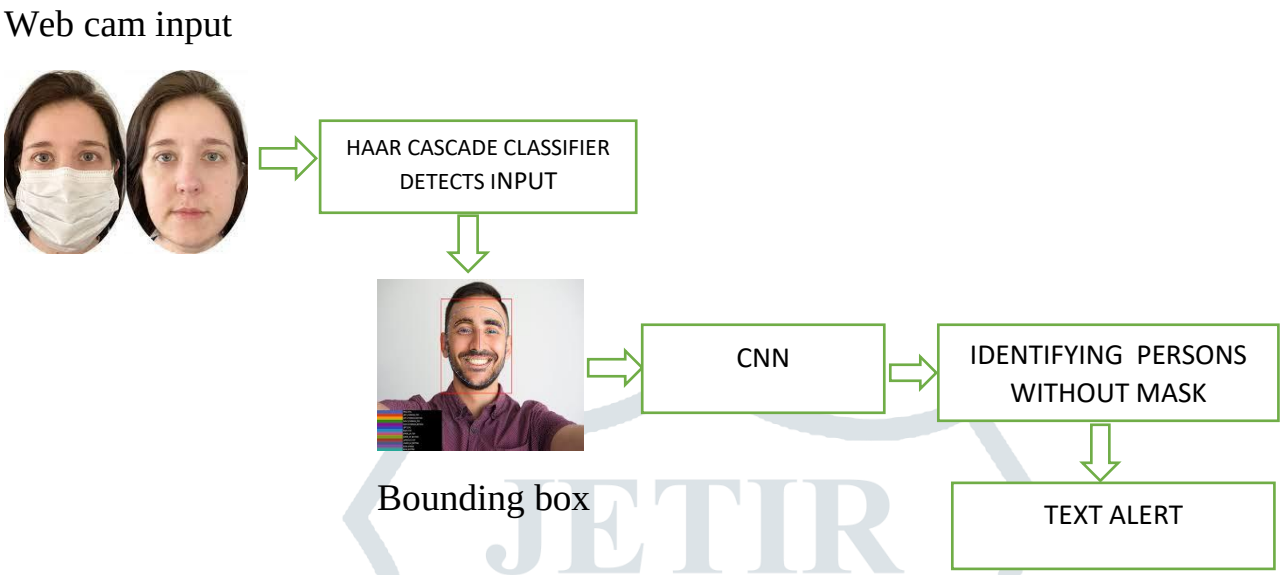

FIG 1: Alert system architecture

1. Dataset Collection

To train architecture,images were collected. The architecture of learning strategy exceptionally relies upon CNN. Data is collected for training and testing the model. Dataset contains images of faces only. It comprises of around 1,315 pictures in which 658 pictures containing individuals with facial coverings and 657 pictures containing individuals without facial coverings. For training purposes, 80% images of each class are used and the rest of the images are utilized for testing purposes.

2. Haar Cascade Classifier

In fig 1, Haar Cascade Classifer will detect the input from videocam. It is an effective way for object detection. In this a lot positive and negative images are used to train the classifier.In this, a model pre-trained with frontal features is developed and used in this experiment to detect the faces in real-time [5].

3. Bounding box

Bounding boxes are one of the most popular and recognized tools when it comes to image processing for image and video annotation projects. A bounding box is an imaginary rectangle that serves as a point of reference for object detection and creates a collision box for that object. In order to train the haar cascade algorithm, bounding boxes are used to identify patterns [13]. The bounding box contains coordinates which has information about where exactly the object resides in the image.Here, bounding box does help to reduce the range of search for the object features and thereby conserve computing resources. It not only helps to classify the objects but also helps in object detection [8].

4. Convolutional Neural Network

Convolutional neural network is a class of deep learning methods which has become dominant in various computer vision tasks and is attracting interest across a variety of domains, including radiology. The model in this paper uses convolutional network It takes the image data as input, captures all the data, and send to

the layers of neurons. It has a completely associated layer, which processes the last result that addresses the prediction about the image.The collected dataset, training the processed data using Convolutional Neural Network (CNN) model and also by using some Machine learning packages like KERAS, Tensor flow, and Open CV [12]. At long last, a real-detection is finished and an text message is sent to the authorities through email if a person is detected that an individual is distinguished not wearing a face mask.

5. Alert Generation

The purpose of our system is to screen person not wearing face mask. The learning architecture generates result on the input image, classifying the image into mask or no mask =classes. In the event that a person is distinguished not wearing a mask then a signal alarm will be created until mask is placed on. What's more, in the event that everybody is wearing a mask, they will be protected from the infection. In this way our system would help greatly to limit the growth of COVID-19.

VI. EVALUATION

The proposed framework identifies regardless of whether an individual is wearing mask or not. Whenever a person with no mask is detected, the text notification is sent to persons mail. The working of the model is as shown in fig 2.

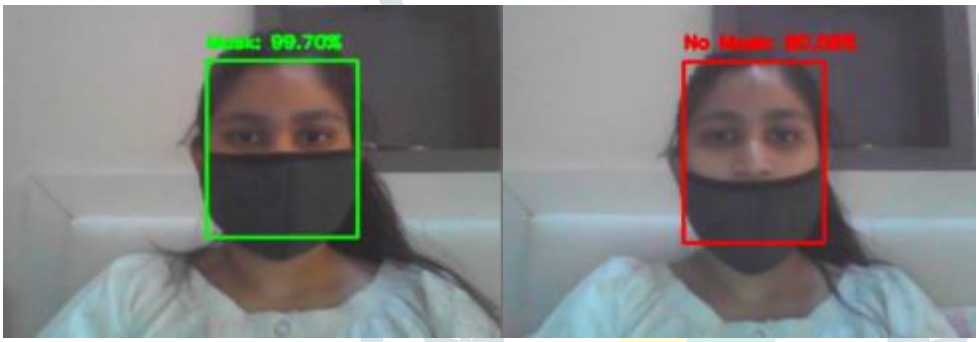

FIG 2: Output of mask and no mask

The above results showcase that the person wearing a mask is shown as “Mask” with an accuracy of 99.70% which is actually a good result, which help in fulfil the motive of the system that is reducing the spread of coronavirus. where there is no 100% of accuracy resulting in over-fitting of accuracy. And a person not wearing a mask is shown as “No Mask” with an accuracy of 80.58%. With this results predicted, the program then sends an alert to “No Mask” to wear a mask through a text message or mail.

VII. CONCLUSION

As the innovation is blasting with arising patterns accordingly the face mask indicator which might perhaps add to public medical services. The model is trained on a authentic dataset. We used OpenCV, tensor flow, keras and CNN to detect whether people were wearing face masks or not. The models were tested with images and real-time video. The precision of the model is accomplished and, the improvement of the model is a ceaseless cycle and we are building an exact arrangement by tuning the hyper parameters. This particular model could be utilized as a utilization case for edge analytics. By the developing this system, we can detect if the person is wearing a face mask and allow their entry would be of great help to the society.

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