Synopsis

On

FACE MASK DETECTION

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ABSTRACT

The COVID-19 is an ongoing crisis that has resulted in a large number of casualties and security concerns. People also wear masks to cover themselves in order to reduce the spread of the coronavirus virus. As certain parts of the face are obscured, this makes face recognition a very difficult job. During the current coronavirus pandemic, a primary goal of researchers is to come up with suggestions to deal with this issue through rapid and effective solutions. In this paper, in order to address the issue of masked face recognition operation, we propose a reliable method based on discarding masked regions and deep learning based features. The first step is discarding the area of the masked face. Next, to extract the best features from the regions collected, we use a pre-trained deep convolutional neural network (CNN) (mostly eyes and forehead regions). Finally, in order to measure them and to get a slight representation compared to the fully connected layer of classical CNN, the Bag-of-features model is applied to the feature maps of the last convolutional layer. Lastly, for the classification process, MLP is used. Experimental findings on the Real-World-Masked-Face-Dataset indicate high success in recognition.

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1.Introduction

Since the end of 2019, infectious coronavirus disease (COVID-19) has been reported for the first time in Wuhan, and it has become a public damage fitness issue in China and even worldwide. This pandemic has devastating effects on societies and economies around the world causing a global health crisis . It is an emerging respiratory infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) . All over the world, especially in the third wave, COVID-19 has been a significant healthcare challenge . Many shutdowns in different industries have been caused by this pandemic. In addition, many sectors such as maintenance projects and infrastructure construction have not been suspended owing to their significant effect on people's routine life.

Two deep learning models are suggested: a CNN and a convolutional long short-term memory (ConvLSTM). To simulate them, two datasets are assumed. A dataset includes CT images, and the other includes X-ray images. The models are tested four times. When they are examined on CT images, the dataset is split into 70% for the training set and 30% testing set. The accuracy value for the CNN model and for the ConvLSTM is the same, equal to 99%. When tested on the augmented dataset A, the testing accuracy of the CNN is 99%, but it is 100% for the ConvLSTM. When tested on the augmented dataset B, the testing accuracy of the CNN is 100%, but it is 99% for the ConvLSTM. When both models are tested on the combined dataset, containing both X-ray and CT images, the testing accuracy is 99% for the CNN and 98% for the ConvLSTM. Finally, when they are tested on the radiography dataset, the testing accuracy is 95% and 88% for the CNN and the ConvLSTM, respectively. We can consider this scenario as a challenging one, because it is called to distinguish between two diseases (COVID-19 and pneumonia) with a high closeness in features.

To prevent ,the WHO recommends practising physical distancing to mitigate the spread of the virus. All over the world, governments are struggling against this type of virus. Many organizations enforce face mask rules for the personal protection. Checking manually if individuals entering an organisation are wearing masks is cumbersome and possibly conflicting [1]. In this context, authors in [6] proposed a deep learning-based model, named MobileNet Mask, to prevent human-to-human transmissions of the SARS-CoV-2 and detect faces with or without mask. Datasets with over 5200 images are used to train and test the model. All the experimental cases are controlled on kaggle that runs in the cloud. .

2.Literature Review

2.1 What is Face Mask Detection :

Face mask detection is an AI based technology that analyzes a video stream to detect and recognize a face mask worn by an individual person or a crowd of people. Our DeepSight software outputs a confidence value for each detection. Every individual is classified either as ‘wearing a mask’ or flagged as ‘not wearing a mask’. If the face mask detector application identifies a user as not wearing a mask, a custom message can be delivered via a digital screen to remind all visitors to wear masks before entering the premises

2.2 How does Face Mask Detection work :

According to the guidelines set by the World Health Organization (WHO) a face mask needs to cover the face fully, including the nose and the chin. Therefore, our detector only classifies someone as wearing a mask if these conditions are satisfied. Our software is also spoof proof which means that it understands if you’re covering your face with a hand or an object other than a mask.

2.3 How to Wear a Mask Correctly?

According to the guidelines set by the World Health Organization (WHO) a face mask needs to cover the face fully, including the nose and the chin. Therefore, our detector only classifies someone as wearing a mask if these conditions are satisfied. Our software is also spoof proof which means that it understands if you’re covering your face with a hand or an object other than a mask.

3.PROJECT OBJECTIVE

- To enforce the mandate wearing masks in public places following the COVID-19 pandemic.
- To effectively provide a working model for accurate mask detection.

- To utilize image processing approaches to identify the presence of a mask on Face.

- To develop an efficient computer vision based techniques system focused on the real time automated monitoring of people to detect facemask in public places.

4. PROJECT METHODOLOGY

We will build a real-time system to detect whether the person on the webcam is wearing a mask or not. We will train the face mask detector model using Keras and OpenCV.

The dataset we are working on consists of 1376 images with 690 images containing images of people wearing masks and 686 images with people without masks.

We are going to build this project in two parts. In the first part, we will write a python script using Keras to train face mask detector model. In the second part, we test the results in a real-time webcam using OpenCV.

Steps to Perform Image Processing :

- Load images using Python or any other programming you are working on.
- Convert images into array
- And finally apply some algorithm on that array

Another good thing is that we have a library known as OpenCV which will help us to read the image and return array of color pixels.

Introduction to OpenCV

- OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library.
- The library has more than 2500 optimized algorithms.
- It has C++, Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS.
- Will help us to load images in Python and convert them into array.

- Each index of array represents (red, green, blue) color pixel which ranges from 0 to 255.

Features of OpenCV

- Face Detection
- Geometric Transformations
- Image Thresholding
- Smoothing Images
- Canny Edge Detection
- Back Segmentatin

Face mask detection is an AI based technology that analyzes a video stream to detect and recognize a face mask worn by an individual person or a crowd of people. Our DeepSight software outputs a confid

5.PROJECT CONCLUSION

A method is designed for detecting if a person is putting on a face mask from a video selfie. Different analysis scenarios have been experimented using diverse types of conventional mask and varied acquisition conditions. The performance of the designed method relies on the efficiency of the exploited face and face-feature detectors. In the present study, wearing glasses had no negative effect. The use of rigid masks seems preferable because they reduce possibilities of wrong positioning on the face. For this latter, the designed prototype can particularly be efficient. Hence, a promising face mask recognition model has been proposed. A proof of concept as well as a development base are provided towards reducing the spread of COVID-19 by allowing people to validate the face mask via their webcam. Moreover, this self-checking of the mask wearing could be exploited by monitoring-related applications as a conformity attribute of mask wearing. Future works may investigate the development of highly robust detectors by training a deep learning model with respect to specified face-feature categories or to correctly and incorrectly weared mask categories.

6.References

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