FACE MASK DETECTION USING DEEP LEARNING

B.Tech Mini Project Synopsis

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**BACHELOR OF TECHNOLOGY IN
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Abstract

In order to prevent the spread of CORONA virus, everyone must wear a mask during the pandemic. In these tough times of COVID-19 it is necessary to build a model that detects people with and without mask in real-time as it works as a simple precautionary measure to prevent the spread of virus. If deployed correctly, this machine learning technique helps in simplifying the work of frontline warriors and saving their lives. A basic Convolutional Neural Network (CNN) model is built using TensorFlow, Keras, Scikit-learn and OpenCV to make the algorithm as accurate as possible. Javascript API helps in accessing webcam for real-time face mask detection. Since Google Colab runs on web browser it can't access local hardware like a camera without APIs. The proposed work contains three stages: (i) pre-processing, (ii) Training a CNN and (iii) Real-time classification. The first part is the Pre-processing section, which can be divided into "Grayscale Conversion" of RGB image, "image resizing and normalization" to avoid false predictions. Then the proposed CNN, classifies faces with and without masks as the output layer of proposed CNN architecture contains two neurons with softmax activation to classify the same. Categorical cross-entropy is employed as loss function. The proposed model has Validation accuracy of 96%. If anyone in the video stream is not wearing a protective mask a red rectangle is drawn around the face with a dialog entitled as NO MASK and a green rectangle is drawn around the face of a person wearing MASK.

1. Introduction

Government and Public health agencies are recommending face mask as essential measures to keep us safe when venturing into public. To mandate the use of facemask, it becomes essential to devise some technique that enforce individuals to apply a mask before exposure to public places. Face mask detection refers to detect whether a person is wearing a mask or not. In fact, the problem is reverse engineering of face detection where the face is detected using different machine learning algorithms for the purpose of security, authentication and surveillance. Face detection is a key area in the field of Computer Vision and Pattern Recognition. A significant body of research has contributed sophisticated to algorithms for face detection in past..

It is difficult to handle person to identify person with mask or without mask in surveillance. The proposed model has Validation accuracy of 96%. If anyone in the video stream is not wearing a protective mask a Red coloured rectangle is drawn around the face with a dialog entitled as NO MASK and a Green coloured rectangle is drawn around the face of a person wearing MASK.

2. Motivation

• Motivated from K. He X. Zhang S. Ren and J. Sun "Deep residual learning for image recognition" 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR) pp. 770-778 2016.

• K. Li G. Ding and H. Wang "L-fcn: A lightweight fully convolutional network for biomedical semantic segmentation" 2018 IEEE International Conference on Bioinformatics and Biomedicine (BIBM) pp. 2363-2367 Dec 2018.
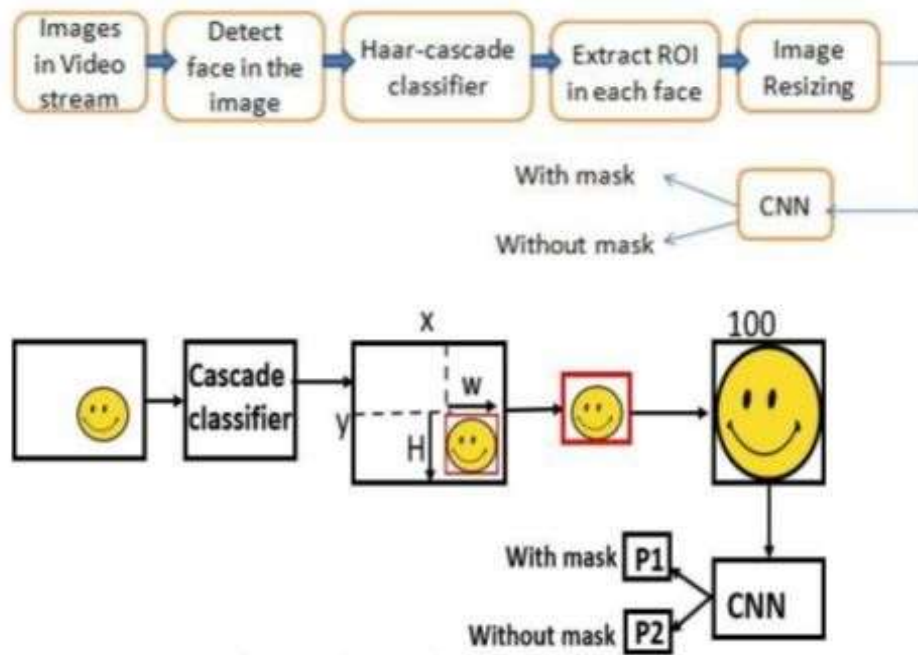
3. Objectives

This paper proposes a method to detect the face mask is put on or not for offices, or any other work place with a lot of people coming to work. We have used convolutional neural network for the same. The model is trained on a real world dataset and tested with live video streaming with a good accuracy. Further the accuracy of the model with different hyper parameters and multiple people at different distance and location of the frame is done.

4. Problem Statement & Proposed Work

Millions of people are being infected by Corona Virus throughout the world rapidly. Even WHO recommends to wear a mask in public places to cut the spread of virus as it is contagious. In this paper, a CNN model is proposed for face mask detection. Object detection when applied on faces helps in detecting faces in the image. Face mask detection refers to detecting faces in the image and then classifying each face as with mask or without mask.

5.Proposed Work/Research Plan

The proposed CNN, classifies faces with and without masks as the output layer of proposed CNN architecture contains two neurons with Softmax activation to classify the same. Categorical cross-entropy is employed as loss function. The proposed model has Validation accuracy of 96%. If anyone in the video stream is not wearing a protective mask a Red coloured rectangle is drawn around the face with a dialog entitled as NO MASK and a Green coloured rectangle is drawn around the face of a person wearing MASK.

5.1 Software/Hardware Detail

The following are the hardware and software requirements that have used to implement the proposed system

Hardware Requirement

System   : Pentium IV 2.4 GHz.

Hard Disk   : 40 GB.

Floppy Drive   : 1.44 Mb.

Monitor   : 15 VGA Colour.

Mouse   : Logitech.

Ram   : 512 Mb.

Software Requirements:

Operating System: Windows

Coding Language: Python 3.7

References

• K. He X. Zhang S. Ren and J. Sun "Deep residual learning for image recognition" 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR) pp. 770-778 2016.

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Websites

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