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RealTime Face Mask Detection using Machine Learning

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Abstract: *The ceaseless spread of Corona infection has prompted supported expansion in the death pace of numerous nations across the globe from the day it began. It is causing a global health crisis so we need to protect ourselves (IBM Cloud Education, "Machine Learning", 2020). One of the methods, the World Health Organization has proposed is the utilization of FACE MASKS to relieve the spread of Virus. (Edgell J et. Al., 2020)*

The System is prepared to recognize precisely if an individual is wearing mask. At the point when the calculation recognizes an individual without mask, a caution ought to be produced to alarm individuals around or the concerned specialists close by, so essential moves can be made against such violators (IBM Cloud Education, "Machine Learning", 2020)]. As a large portion of the establishments, organizations, businesses, shopping centres, medical clinics, need to begin working with not many relaxations before this pandemic is totally deleted, coordinating face mask location framework with the current access control framework at passage and leave focuses is enthusiastically suggested.

We have developed a model using ***Deep Learning and Machine Learning*** *to detect Facemasks (Militante et. al., 2020). The Face cover recognition dataset contains pictures of the two individuals with mask and without masks and we are utilizing Open CV for Real-time face discovery by means of our webcam. We are using this dataset along with various other technologies like* ***Python, Tensor Flow, Keras, Open CV*** *to build this Face mask detector.*

Keywords : *Open CV, Computer Vision, Deep Learning, Keras, Tensor Flow.*

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Introduction:

Before Coronavirus Pandemic, Individuals used to wear covers to shield their wellbeing from air contamination. While some people wear it since they are reluctant about their looks (Militante et. al., 2020)], they conceal their feelings from general society by concealing their countenances, etc. But nowadays, it's

not one's choice to wear masks rather than it has become mandatory to ensure **safety** to people.

Covid sickness (COVID-19) is an airborne irresistible infection brought about by a newfound Covid-19 (IBM Cloud Education, "Machine Learning", 2020)]. Individuals who are contaminated with this infection will have gentle to genuine respiratory sickness and may not recuperate without requiring exceptional therapy. More seasoned individuals and individuals who as of now have clinical issues like cardiovascular illness, diabetes, ongoing respiratory infection, and malignancy are at higher risk.

In excess of 5,000,000 cases were tainted by COVID-19 in under a half year across 188 nations. The infection spreads through close contact and in swarmed and packed zones.

The World Health Organization (WHO) reports suggest that the two main routes of transmission of the COVID-19 virus are ***respiratory droplets and physical contact.*** Respiratory droplets are generated when an infected person coughs or sneezes. Any person in close contact (within 1 meter) with someone who has respiratory symptoms (coughing, sneezing) is at risk of being exposed to potentially infective respiratory droplets. Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Wearing a medical/NORMAL mask is one of the prevention measures that can limit the spread of certain respiratory viral diseases, including COVID-19.

So, people must wear the masks when they need to step out of their homes and there is a need that authority strictly will ensure that people are wearing mask in public places as well as in crowded places.

To ensure that people are following the basic rules, a solution should be developed. This Face Mask Detection System can be utilized to guarantee this. Face Mask Detection intends to check if an individual is wearing mask.

The first step to perceive the presence of a cover on the essence of an individual is to recognize the face, which makes the procedure isolated into two sections: -

- To detect the faces
- To detect masks on those faces.

Objectives:

The basic objective of the system is to detect the presence of a face mask on human faces on live streaming video as well as on images. We have used deep learning method to make our face detector model. The main aim is to identify the people in the image/Video Stream is wearing face mask or not.

If multiple faces are present, each face is enclosed by a bounding box and thus we know the location of face and that person is wearing mask or not.

Test results show that our model performs well on the test information with 100% and 99% exactness and review, separately.

Methodology:

Dataset: The dataset that we have used for our proposed system consist a total of 3136 images, out of which 1582 images are of people with masks and 1654 are of people without masks. The images that we have taken are of different sizes and resolutions, and were extracted from different sources (like Kaggle Dataset) or from machines (cameras) of different resolutions.

We need to part our dataset into three sections (Wang et. al., 2020)]:

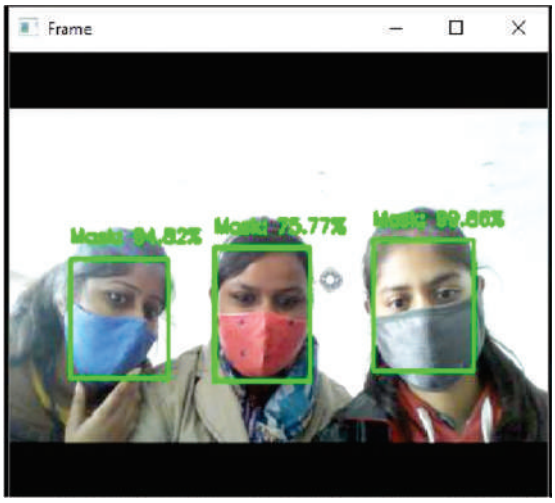
- Training dataset
- Test dataset
- Validation dataset

Simple architecture:

Our proposed framework targets arranging if a specific individual is wearing a mask or not. This should be possible by taking the contribution from:

- Images
- Real-time Videos

The proposed framework considers dataset of absolute 3136 pictures.

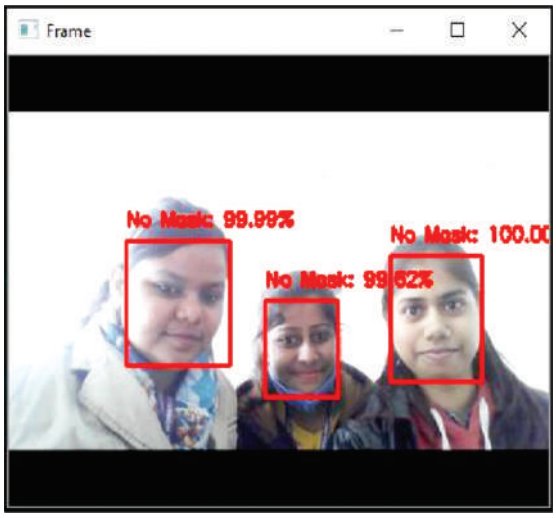


Picture with Mask

The characterizations of the pictures are finished via preparing the model in 2 stages (IBM Cloud Education, "Machine Learning", 2020)]:

Stage 1:

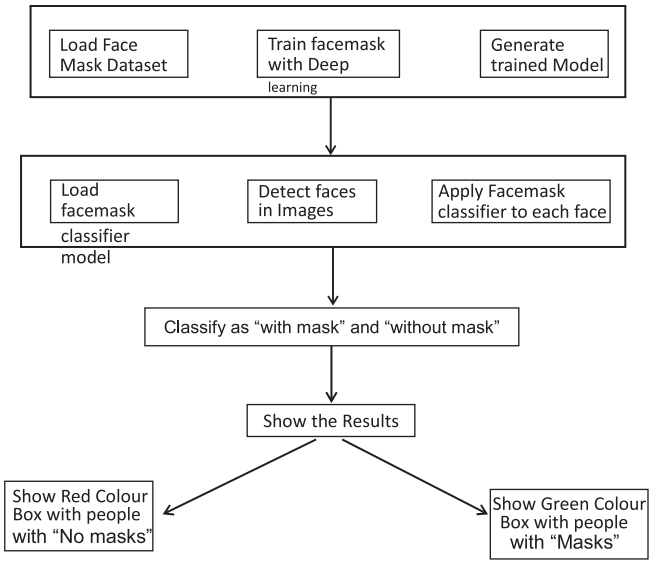
- Facemask dataset is stacked into the framework.
- Classifiers like Mobile NetV2 is utilized to produce a prepared model.



Picture Without Mask

Stage 2:

- Load the face veil classifier model.
- Detect faces in the pictures/video transfer.
- Apply the classifier to each faceRoI.
- Classify the pictures to be "With Mask" and "Without Mask" with Confidence.



Experimental Results:

The Face Mask Detection framework is a profound learning arrangement that utilizes Open CV and Tensor Flow, to prepare the model (Edgell et. al., 2020)]. We join the profound learning MobileNetV2 modular with the SSD structure for a quick and proficient profound learning answer for constant human location in video transfers and are recognized by camera progressively out in the open places and contains altered information assortment to determine a face veil discovery model with difference in the kinds of face covers worn by people in general continuously by methods for an exchange of figuring out how to a pre-prepared SSD face locator(Edgell et. al., 2020)].

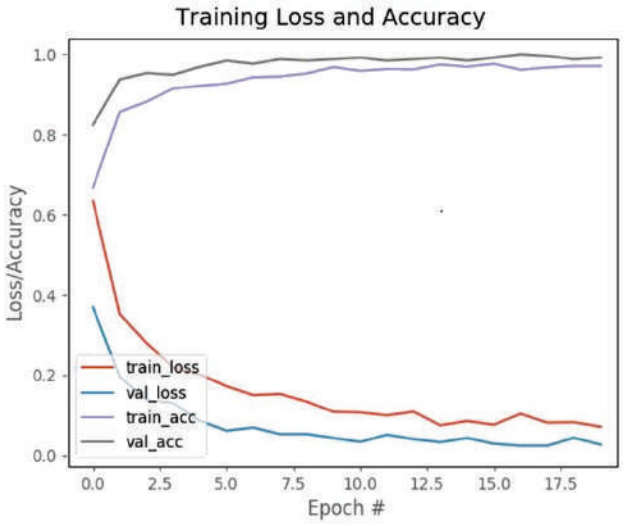
In the proposed system, four stages were followed, for example (Edgell et. al., 2020)]:

1) Data collection and pre-processing
2) Model development and training
3) Model testing
4) Model implementation

Our proposed system utilizes the AI approach and will adjust the MobileNetV2 model, which is a profoundly proficient design that can be applied to edge gadgets with restricted processing power, for example, raspberry pi4 to identify individuals continuously. We utilized 80% of our absolute custom informational collection to prepare our model with a solitary shot locator, which makes just a single effort to recognize various articles

that are available in a picture utilizing multibox. The custom informational collection is stacked into the undertaking catalog and the calculation is prepared based on the named pictures.

In pre-handling steps, the picture is resized to 256×256 pixels, changed over to NumPy exhibit design and the relating names are added to the pictures in the dataset prior to utilizing our SSD model as contribution to construct our custom model with MobileNetV2 as the spine and train our model utilizing the Tensor Flow Object Detection API.



Model Training Accuracy / Loss Curve

Conclusion:

In this undertaking, we have built up a profound learning model for face veil identification utilizing Python, Keras, and OpenCV. We built up the face veil indicator model for recognizing if individual is wearing a cover (Militante et. al., 2020)]. We have prepared the model utilizing Keras with network engineering. Preparing the model is the initial segment of this task and testing utilizing webcam utilizing OpenCV is the subsequent part. This was a decent undertaking for fledglings like us to execute our learnings and gain mastery.

Hence, this proposed framework will work in an effective way in the current circumstance when the lockout is facilitated and assists with following public places effectively in a mechanized way. We have tended to top to bottom the following of social removing and the recognizable proof of face veils that help to guarantee human wellbeing. The usage of this arrangement was effectively tried progressively by sending model (Inamdar et. al., 2020)]. The arrangement can possibly altogether lessen infringement by constant intercessions, so the proposed framework would improve public wellbeing through saving time and assisting with diminishing the spread of Covid-19. This arrangement can be utilized in places like sanctuaries, shopping complex, metro stations, air terminals, and so forth.

References:

Militante, S. V., & Dionisio, N. V. (2020). Deep Learning Implementation of Facemask and Physical Distancing Detection with Alarm Systems. In 2020 Third International Conference on Vocational Education and Electrical Engineering (ICVEE) (pp. 1-5).IEEE.

Rosebrok, A. (2020). COVID-19: Face Mask Detector with OpenCV, Keras/ Tensor Flow and Deep Learning. https://www.pyimagesearch.com/2020/05/04/covid-19-face-mask-detector-with-opencv-keras-tensorflow-and-deep-learning/(visited on 21st December, 2020)

Inamdar, M., & Mehendale, N. (2020). Real-Time Face Mask Identification Using Facemasknet Deep Learning Network. Available at SSRN 3663305. https://www.researchgate.net/publication/344173985_Face_Mask_Detector(visited on 23rd December, 2020)

Tengjiao Wang, Fang Yang, and Jian Song, "Deep learning-based detection scheme for visible light communication with generalized spatial modulation," Opt. Express 28, 28906-28915 (2020)

EdgellJ., Andrew T., “Limitations of Facial Recognition Technology”, Fed Tech, November 2020. https://fedtechmagazine.com/article/2013/11/4-limitations-facial-recognition-technology#:~:text=security%20best%20practices.-,1(visited on 18th November, 2020)

IBM Cloud Education, “Machine Learning”, 15 July, 2020. https://www.ibm.com/cloud/learn/machine-learning (visited on 29th September, 2020)

Web links:

https://www.guru99.com/keras-tutorial.html

https://www.tutorialspoint.com/pycharm/pycharm_introduction.htm

https://developer.ibm.com/technologies/artificial-intelligence/articles/cc-get- started-tensorflow/

https://www.ibm.com/topics/computer-vision