# FACE MASK DETECTION USING ML

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***Abstract-*** *As we all know COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. So wearing a mask, wearing a protective face mask is become the new normal. However, still have few ways to control the outbreak as instructed by the WHO (World Health Organization).Hence Using Face Mask Detection System, one can monitor if the people are wearing masks or not. This project presents a simplified approach to achieve this purpose using some basic Machine Learning packages like TensorFlow, Keras, Open, CV and Scikit-Learn. There are a few processes involved in achieving the objective of the project that includes pre-processing, data augmentationn, training ,testing, and image segmentation. The method attains accuracy up to 95.77 percent and 94.58 percent respectively on two different datasets.*

***Keywords****- Tenserflow, openCV, Keras, Numpy, Scikit-Learn.*

## I. INTRODUCTION

COVID-19 pandemic has had an enduring effect in many nations global due to the fact that December 2019. It originated in Wuhan, China. The World Health Organization (WHO) as of March 11, 2020, declared it a pandemic that received its roots throughout the globe and critically affected 114 countries. Every clinical professional, healthcare organizations, clinical practitioners, and researchers are searching for right vaccines and drugs to conquer this lethal disease, but no leap forward has been stated until date. The virus spreads thru air channel whilst an inflamed man or woman sneezes or talk with the alternative man or woman, the water droplets from their nostril or mouth disseminate thru the air and have an effect on different peoples withinside the vicinity (Kumar et al., 2020). Face Mask detection has turn out to be a trending software because of the Covid-19 pandemic, which needs someone to put on face masks, maintain social distancing, and use hand sanitizers to scrub their hands. While different issues of social distancing and sanitization were addressed till now, the problem of face masks detection has now no longer but been accurately addressed. Wearing a masks all through this pandemic is a essential safety measure and is maximum crucial step in instances whilst social distancing is tough to maintain.

Face Mask detection has became as much as be an outstanding hassle withinside the area of photograph processing and pc vision. Face detection has diverse use instances starting from face popularity to shooting facial motions, in which the latter requires the face to be discovered with very excessive precision. Due to the speedy development withinside the area of device gaining knowledge of algorithms, the jeopardies of face masks detection era appear to be properly addressed yet. This era is extra applicable these days because it is used to detect faces not only in static images and videos but also in real-time inspection and supervision.

## II. LITURATURE SURVEY

In the latest past, diverse researchers and analysts specifically targeted on gray-scale face image. While a few had been absolutely constructed on sample identity models, owning preliminary facts of the face version whilst others had been the use of AdaBoost, which changed into an fantastic classifier for schooling purposes. Then got here the Viola-Jones Detector, which supplied a leap forward in face detection technology, and real-time face detection were given possible. It confronted diverse issues just like the orientation and brightness of the face, making it tough to intercept. So basically, it did not paintings in stupid and dim light. Thus, researchers began out looking for a brand new opportunity version that might effortlessly discover faces in addition to mask at the face.

## III.    METHODOLOGY

To are expecting whether or not someone has worn a masks correctly, the preliminary degree might be to educate the version the usage of a right dataset. After education the classifier, an correct face detection version is needed to come across faces, in order that the SSDMNV2 version can classify whether or not the man or woman is carrying a masks or not. The mission on this paper is to elevate the accuracy of masks detection with out being too resource-heavy. For doing this mission, the DNN module become used from OpenCV, which incorporates a 'Single Shot Multibox Detector' (SSD) item detection version with ResNet-10 as its spine architecture. This technique enables in detecting faces in real-time, even on embedded gadgets like Raspberry Pi. The following classifier makes use of a pre-educated version MobileNetV2 to are expecting whether or not the man or woman is carrying a masks or not.
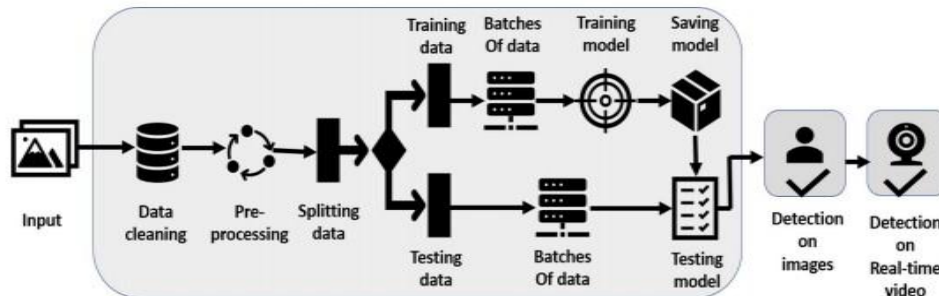


## IV.    DATASET USED

There are just a few datasets to be had for the detection of face masks. Most of them are both artificially created, which doesn't constitute the actual international accurately, or the dataset is complete of noise and incorrect labels. So, selecting the proper dataset which might paintings nice for the SSDMNV2 version required a bit effort. The dataset utilized in for schooling the version in a given technique become a aggregate of numerous open-supply datasets and pictures, which blanketed information from Kaggle's Medical Mask Dataset through Mikolaj Witkowski and Prajna Bhandary dataset to be had at PyImage Search.
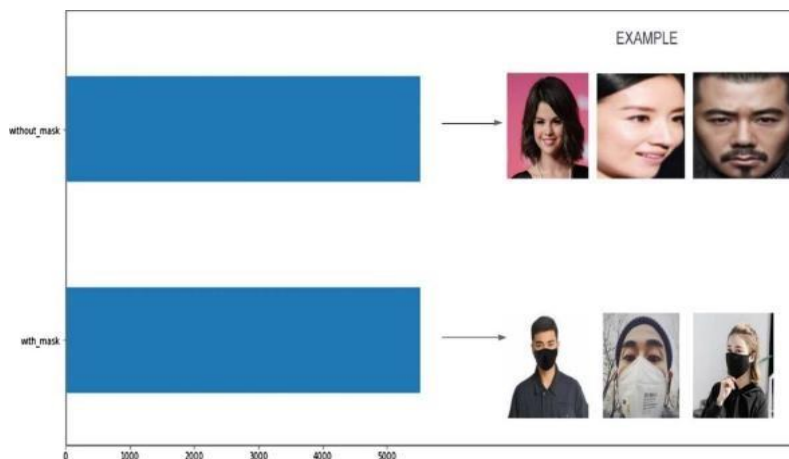


## V.    PRE-PROCESSING

There are just a few datasets to be had for the detection of face masks. Most of them are both artificially created, which doesn't constitute the actual global accurately, or the dataset is complete of noise and incorrect labels. So, selecting the proper dataset which might paintings pleasant for the SSDMNV2 version required a touch effort. The dataset utilized in for education the version in a given technique changed into a aggregate of diverse open-supply datasets and pictures, which blanketed information from Kaggle's Medical Mask Dataset with the aid of using Mikolaj Witkowski and Prajna Bhandary dataset to be had at PyImage Search.

## VI.　DATA AUGUMENTATION

For the schooling of SSDMNV2 model, an large amount of facts is essential to carry out schooling efficaciously because of the non availability of an ok quantity of facts for schooling the proposed model. The technique of facts augmentation is used to resolve this issue. In this technique, strategies like rotation, zooming, shifting, shearing, and flipping the photo are used for producing several variations of a comparable photo. In the proposed model, photograph augmentation is used for the facts augmentation process. A characteristic photograph facts technology is created for photograph augmentation, which returns take a look at and educate batches of facts.

## VII.　FACE DETECTION USING OPEN CV -DNN

This version is covered withinside the GitHub repository of OpenCV, beginning from the trendy version. It is installed on the 'Single Shot Multi-container Detector' (SSD) and uses

'ResNet-10' structure because the base-version. The Single Shot Multi-container Detector is just like YOLO approach which takes simplest one shot to come across a couple of gadgets found in an picture the usage of Multibox. It is appreciably quicker in velocity and excessive accuracy item detection algorithm. The photos from which the version is traine have now no longer been disclosed. Two variations of the version are made to be had through OpenCV: i.) Caffe Implementation (Floating factor sixteen version) ii.) Original TensorFlow Implementation (8-bit quantized version)

## VIII.　IMPLEMENTATION LANGUAGE

Python is an interpreted, object-oriented, high-stage programming language with dynamic semantics. Its highstage constructed in facts structures, blended with dynamic typing and dynamic binding, make it very appealing for Rapid Application Development, in addition to to be used as a scripting or glue language to attach current additives together. Python's simple, smooth to analyze syntax emphasizes clarity and consequently reduces the fee of application maintenance. Python helps modules and packages, which inspires application modularity and code reuse. The Python interpreter and the giant widespread library are to be had in supply or binary shape with out price for all most important platforms, and may be freely distributed. Here we list basic features that make Python a powerful & popular programming language.

　　⬜ **Easy to Code**

　　- 　Python is very easy to code as compared to other popular languages like Java and C++.

　　- 　Anyone can learn **Basic Python syntax** in just a few hours. Thus, it is programmer-friendly.

⬜　　Object Oriented

　- 　A programming language that can model the real world is said to be object-oriented. It focuses on objects and combines data and functions.

　- 　Contrarily, a procedure-oriented language revolves around functions, which are codthat can be reused.

　- 　Python supports both procedure-oriented and object-oriented programming which is one of the key python features.

　- 　It also supports multiple inheritance, unlike Java.

　- 　A class is a blueprint for such an object. It is an abstract data type and holds no values.

## IX.　TRAIN MODEL

To begin, the libraries needed for the implementation process were imported, including tensorflow, numpy, imutils, keras, opencv, scipy, and matplotlib. Datasets were also imported using the import technique. Model's directory has been created and the path to the dataset folder in the directory. In this area, there is category. Within the category, there are two values: one

with mask and the other without. Through these two categories, a loop function has been applied.also demonstrates that the program started with the initial learning rate and then switched to a lower learning rate. Because the learning rate has been used less than the loss, the loss has been appropriately estimated. As a result, the level of accuracy was high.

## X.   TESTING

To run the model, the computer's command prompt was opened and navigated to the location where the relevant training file was located. The python keyword was typed, followed by the file name train_mask.py, and the enter key was hit to start it. After that, the training phase of this model started. All the images had to be trained, which took a lengthy time. The "plot.png" image of the findings was stored in the project folder after the mask detector model was trained. The accuracy and training loss 29 were plotted. The accuracy and loss have been precisely conveyed. The model appeared to be in good form. The epochs down were given up to 20 epochs. The model's functioning performance was excellent, The "plot.png" and mask detector filles have been saved on the local desk. Face detection was performed using two filles that were downloaded and saved in the face-detector folder. For the camera operation, OpenCV was used.

## XI.   CONCLUSION

In the proposed face masks detection version named SSDMNV2, each the education and improvement of the photograph dataset, which turned into divided into classes of human beings having mask and those now no longer having mask had been performed effectively. The method of OpenCV deep neural networks used on this version generated fruitful results. Classification of snap shots turned into performed correctly the use of the MobilenetV2 photograph classifier, that's one of the specialty of the proposed approach.          Many present researches confronted complicated results, whilst a few have been capable of generate higher accuracy with their dataset. The hassle of numerous incorrect predictions had been effectively eliminated from the version because the dataset used turned into accrued from numerous different reassets and snap shots utilized in the Dataset turned into wiped clean manually to boom the accuracy of the results. Real-international programs are a far greater hard trouble for the approaching future. The SSDMNV2 version ought to with any luck assist the involved government on this first-rate pandemic scenario which had in large part received roots in maximum of the international; different researchers can use the dataset supplied on this paper for in addition superior fashions together with the ones of face recognition, facial landmarks, and facial element detection process.

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