A Synopsis Report

[Based on B.Tech Final Year BTP]On

Face Mask Detection

Submitted By

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CANDIDATES' DECLARATION

I hereby declare that the major project work being presented in this report entitled "**Face Mask Detection**" submitted in the departmentof Information Technology, University Institute of Engineering and Technology, Kanpur is the authentic work carried out by us under the guidance of Er. Prateek Srivastava.

Date: 17/12/2021

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On the submission of our Synopsis report on "**Face Mask Detection**"

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Date: 17/12/2021

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Abstract

Changes in the lifestyle of everyone around the world. In those changes wearing a mask has been very vital to every individual. Detection of people who are not wearing masks is a challenge due to Outbreak of the Coronavirus pandemic has created various the large number of populations. This project can be used in schools, hospitals, banks, airports, and etc. as a digitalized scanning tool. The technique of detecting people's faces and segregating them into two classes namely the people with masks and people without masks is done with the help of image processing and deep learning. With the help of this project, a person who is intended to monitor the people can be seated in a remote area and still can monitor efficiently and give instructions accordingly. Various libraries of python such as Open CV, Tensor flow and Keras. In Deep Learning Convolution Neural Networks is a class Deep Neural Networks which is used to train the models used for this project.

The purpose of the project "Face Mask Detection " is to create a tool that identifies the image of a human that can calculate the probability that he/she wearing a mask or not. Due to COVID, starts going through various stages of reopening, face masks have become an important element of our daily lives to stay safe. Wearing face masks will be required in order to socialize or conduct business. So, this application utilizes a camera to detect if a person is wearing a mask or not.

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1. Introduction

1.1. Overall Description:

The trend of sporting face mask publically is rising because of the Covid-19 epidemic everywhere in the world. Because Covid-19 people wont to wear mask to shield their health from air pollution. Whereas other are self-conscious concerning their looks, they hide their emotions from the general public by activity their faces. Somebody treated the wearing face masks works on hindering Covid-19 transmission. Covid-19 is that the last epidemic virus that hit the human health within the last century .In 2020, the fast spreading of Covid-19 has forced the who to declare Covid-19 as international pandemic. Quite 5 million cases were infected by Covid-19 in not up to half dozen month across 188 countries. The virus spreads through shut contact and in packed and overcrowded areas. The corona virus epidemic has given rise to a unprecedented degree of worldwide scientific cooperation.Computer science supported machine learning and deep learning will facilitate to fight Covid-19 in several ways.Machine learning a valuate huge quantities of knowledge to forecast the distribution of Covid-19 to function early warning mechanism for potential pandemics, and classify vulnerable population. Folks are forced by laws to wear face masks publically many countries.These rules and law we have a tendency yore developed as associate degree action to the exponential growth in cases an deaths in several areas.

However, the method observation massive teams of individuals are changing into a lot of difficult. The monitoring process involves the finding of anyone who isn't sporting a face mask. Here we introduce a mask face detection model that's supported machine learning and image process techniques. The planned model may be detect the mask with image and real time detection people wearing mask or not wearing amask. The model is integration between deep learning and classical machine learning techniques with Oven CV, Tensor Flow and Keras. We have a tendency to introduced a comparison between them to seek out the foremost appropriate algorithm program that achieved the very best accuracy and consumed the smallest mount time within the method of coaching and detection.

1.1.1 CNN (Convolution Neural Network)

CNN Convolutional Neural Network are designed to process data through multiple layers of arrays. This type of neural networks is used in application like image recognition of face recognition. The primary difference between CNN and other ordinary neural network is that CNN takes input as a two dimensional array and operates directly on the images rather than focusing on feature extraction which other neural network focus on.The dominant approach of CNN includes solutions for problems of recognition. Top companies like google and facebook have invested in research and developments towards recognition projects to get activites done with greater speed.

1.1.2 Training of CNN Model

Convolutional Neural Network in this planned method, the mask detection model is constructed victimization the successive API of the Keras library. This permits us to make the new layers for our model step by step. The assorted layers used for our CNN model is represented below.

The **1st layer** is that the Conv2D layer with one hundred filters and therefore the filter size or the kernel size of 3x3. During this first step, the activation operate used is the “ReLu”. This ReLu function stands for the corrected linear measure which is able to output the input directly if is positive, otherwise it’ll output zero. The input size is also initialized as 150X150X3 for all the photographs to be trained and tested victimization this model.

In the **second layer**, the MaxPooling2D is employed with the poll size of 2x2.

The **next layer** is once more a Conv2D layer with another one hundred filters of constant filter size 3X3 and {also the} activation operate used is that the ‘ReLu’. This Conv2D layer is followed by a MaxPooling3=2D layer with poll size 2x2.

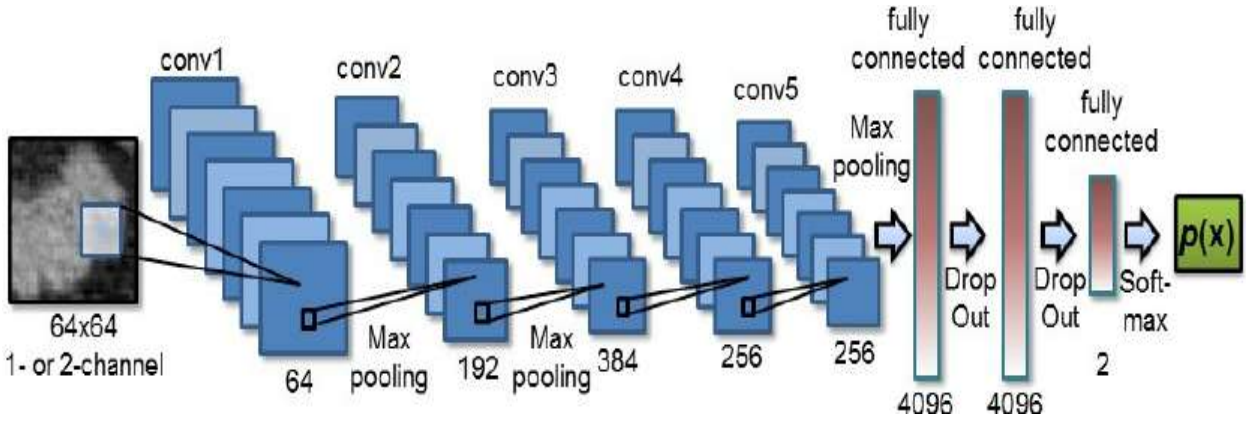
In consecutive step, we have a tendency to use the **flatten () layer** to flatten all the layers into one 1D layer.

After the flatten layer, we use the dropout (0.5) layer to forestall the model

form overfitting.

Finally, towards the end, we have a tendency to use the **dense layer** with fifty units and therefore the activation operate as ReLu.

The last layer of our model are going to be another dense layer with solely 2 units and the activation function used will be the 'softmax' function. The softmax function outputs a vector which is able to represent the chance distribution of every of the input units. Here, two inputs units are used. The softmax function will output a vector with two probability distribution values.



1.2. Purpose

In this work, we propose a introduce a mask face detection model that's supported machine learning and image process techniques. The planned model may be detect the mask with image and real time detection people wearing mask or not wearing amask. The model is integration between deep learning and classical machine learning techniques with Oven CV, Tensor Flow and Keras. We have a tendency to introduced a comparison between them to seek out the foremost appropriate algorithm program that achieved the very best accuracy and consumed the smallest mount time within the method of coaching and detection.

2. Proposed Model

2.1. Programming language Requirement

Python is a widely used high-level programming language for general purpose programming, created by Guido van Rossum and first released in1991. An interpreted language, Python has a design philosophy which emphasizes code readability (notably using whitespace indentation todelimit code blocks rather than curly braces or keywords), and a syntax which allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small andlarge scale.

Python features a dynamic type system and automatic memory management and supports multiple programming paradigms, including object-oriented, imperative, functional programming, and procedural styles. It has a large and comprehensive standard library.

2.2. Libraries required

2.2.1 NumPy

NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. Using NumPy in Python gives functionalitycomparable to MATLAB since they are both interpreted, and they both allow the user to write fast programs as long as most operations work on arrays or matrices instead of scalars.

2.2.2 MATPLOTLIB

MATLAB boasts a large number of additional toolboxes, notably Simulink, whereas NumPy is intrinsically integrated with Python, a more modern and complete programming language. Moreover, complementary Python packages are available; SciPy is a library that adds more MATLAB- like functionality and Matplotlib is a plotting package that provides MATLAB-like plotting functionality.

2.2.3 PANDAS

Pandas is an open-source Python Library providing high- performance data manipulation and analysis tool using its powerful data structures. The name Pandas is derived fromthe word Panel Data– an Econometrics from Multidimensional data.

2.2.4 Oven CV

Open CV (Open Source Computer Vision Library) is a collection of algorithms for computer vision. it basics focus on real time image processing it is free for commercial and research use under a BSD license.

2.2.5 Tensor Flow

Tensor Flow is a mathematical computation library for training and building your machine learning and deep learning model with a simple to use high level APIs.

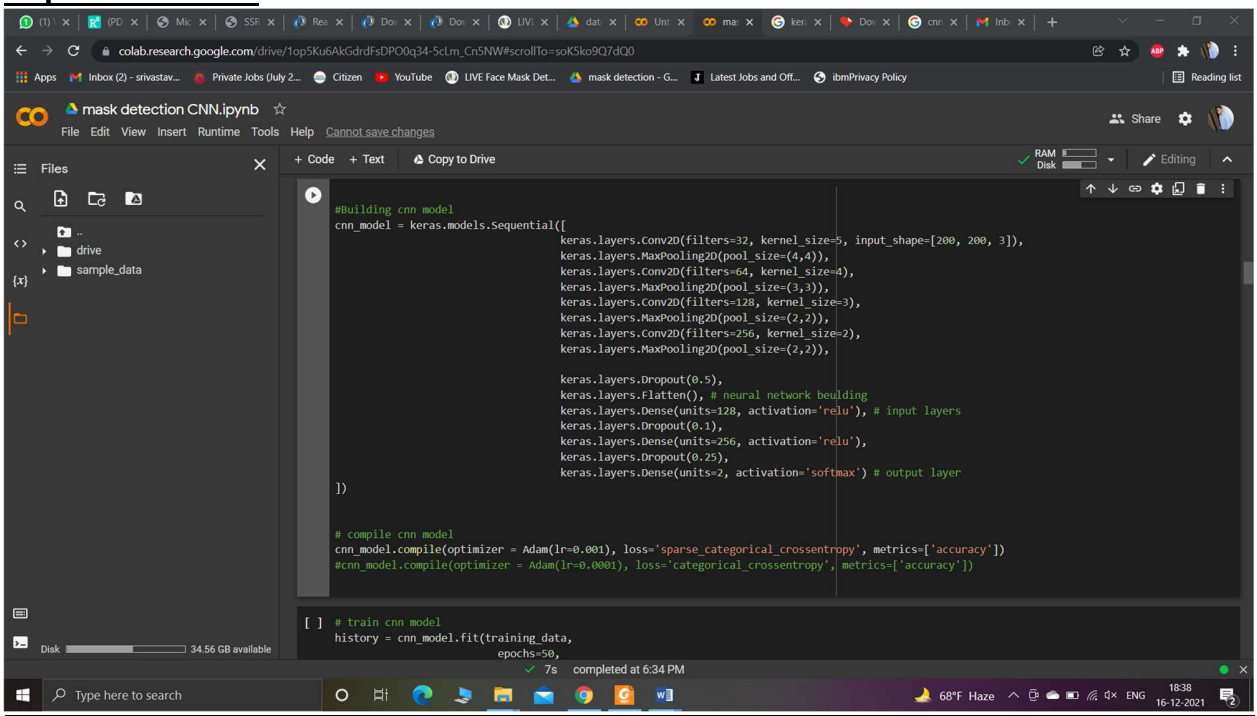
2.2.6 Keras

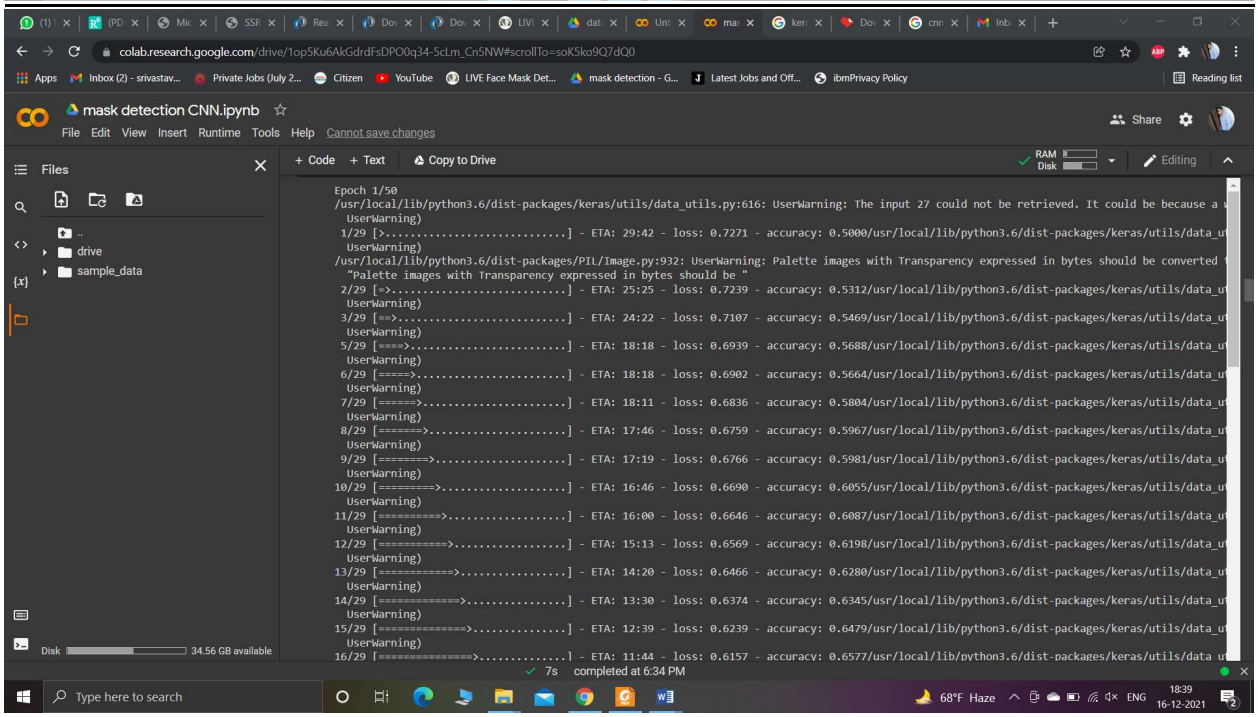
Keras is a neural network API. It is library written specifically in python. In addition, It works with other libraries and packages such as tensorflow which makes deep learning easier. Keras was developed to allow for quick experimentation and for fast prototyping.

Raw Data

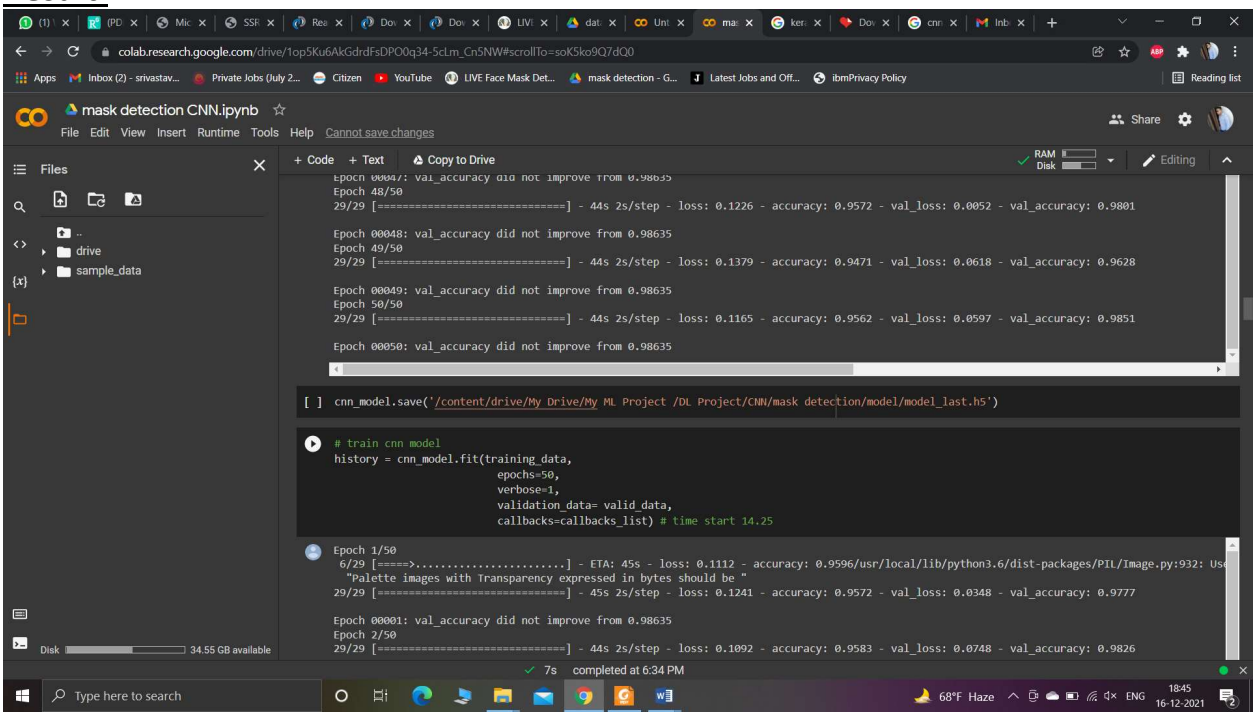
In this stage, the historical data is collected from https://data-flair.training and https://indianaiproduction.com this historical data is used for the training of CNN model. We will use python built in library pandas function web-reader for web scrapping.

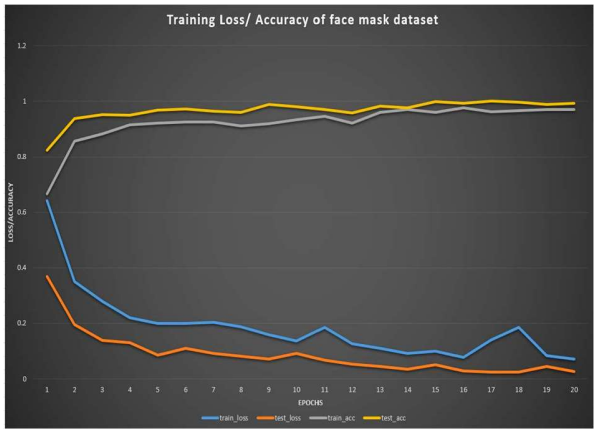
Implementation:





3. Result:





As we have collected dataset and train our model using Supervised learning algorithm CNN to detect if a person wearing a mask or not.

And using epochs=50 we acquire more and more accuracy. And by keep tracking of values we save our model wherever we got best accuracy and minimum loss.

4. Conclusion:

As the technology are blooming with emerging trends the availability so we have novel face mask detector which can possibly contribute to public health care department. The architecture consists of MobileNetV2 classifier and ADAM optimizer as the backbone it can be used for high and low computation scenarios. The our face mask detection is trained on CNN model and we are used Oven CV, Tensor Flow, Keras and python to detect whether person is wearing a mask or not . The model was tested with image and real- time video stream. The accuracy of model is achieved and, the optimization of the model is continuous process. This specific model could be used as use case of edge analytics.

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