

Face Mask Detection using Machine Learning

Project Report

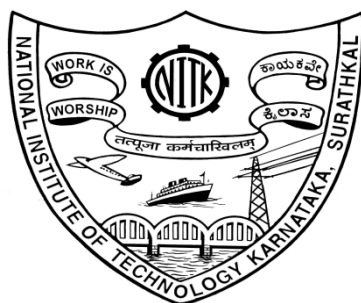
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by

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Abstract

Face masks were necessary for the Corona virus pandemic of 2020-21. Most companies, banking sector, prefer face authentication instead of fingerprint, signature, and card verification. Face mask gives protection against Corona virus. In the case of facial recognition, a machine should detect and recognise the face in a picture. In this paper used methods are supported by machine learning that permits a machine to evolve through a learning process and to perform recognition tasks. Face detection algorithm was introduced by Viola and Jones. training dataset contains both masked and non-masked faces. This project recognize faces in a real time video stream. Facial recognition has been done with a Support Vector Machine classifier. All are implemented in Python with OpenCv with tools modules.

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Chapter 1

INTRODUCTION

In covid time,it was mandatory for all the citizens to wear a face mask to protect themselves from COVID-19. This application can be helpful for all the hospitals,shop owners, offices, banks or any public place because if anyone is not wearing a mask then he or she must not be allowed in that area. So, to take care of this problem we don't need any guard or person who keeps a watch on people. We can integrate a camera which continuously clicks pictures of humans and detect from there faces whether they are wearing a face mask or not

STEPS:

- COLLECT FACE DATASET WITH AND WITHOUT MASK
- TRAIN DATA USING MACHINE LEARNING
- DO PREDICTION ON LIVE DATA USING CAMERA

A Commonly method used identification of the person is made through fingerprint since each individual is unique and can be populated very easily. However, in this pandemic condition, fingerprint identification is even more dangerous. As a result, facial recognition became more prominent. To recognize the identity of a person through a non-contact method is the safest in this pandemic era of COVID.

Chapter 2

Proposed System

this will be real time face mask detection .we can put camera in the main gate of the office,bank, and other crowded places so that we can detect the person is wearing mask or not.

2.1 Advantages of proposed system:

1. system can detect face mask without interaction of any one else,every one will be safe from the virus.
2. Proposed System gives low cost implementaion,instead of some guard,this system can detect face mask.
3. easy to set system
4. It is a real time application

Chapter 3

System Requirements

3.1 OpenCv

- we have a library known as OpenCV which will help us to read the image and return array of color pixels
- 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.
- `import cv2`
- `!pip install opencv-python`

3.2 face detection algorithm

we are going to see how to detect face from an image. Face detection algorithm was introduced by Viola and Jones in 2001. They divided this algorithm in four stages :

- Haar Features Selection
- Integral Images
- AdaBoost
- Cascading Classifier

3.3 Train data using machine learning

Support Vector Machine(SVM) is a supervised machine learning algorithm used for both classification and regression. Though we say regression problems as well its best suited for classification. The objective of SVM algorithm is to find a hyperplane in an N-dimensional space that distinctly classifies the data points. The dimension of the hyperplane depends upon the number of features. If the number of input features is two, then the hyperplane is just a line. If the number of input features is three, then the hyperplane becomes a 2-D plane. It becomes difficult to imagine when the number of features exceeds three.

Chapter 4

SYSTEM IMPLEMENTATION

4.1 Collecting Dataset

using OpenCv we are going to collect the images with and without mask.



Figure 4.1: with mask

4.2 Face Detection Algorithm

So now we are going to see how to detect face from an image. Face detection algorithm was introduced by Viola and Jones in 2001. the data set we have collected using OpenCv we are going to apply this algorithm to label face in the image datasets.



Figure 4.2: without mask

4.3 Train Data Set using SVM Algorithm

Support Vector Machine(SVM) is a supervised machine learning algorithm used for both classification and regression. Though we say regression problems as well its best suited for classification. The objective of SVM algorithm is to find a hyperplane in an N-dimensional space that distinctly classifies the data points. The dimension of the hyperplane depends upon the number of features. If the number of input features is two, then the hyperplane is just a line. If the number of input features is three, then the hyperplane becomes a 2-D plane. It becomes difficult to imagine when the number of features exceeds three

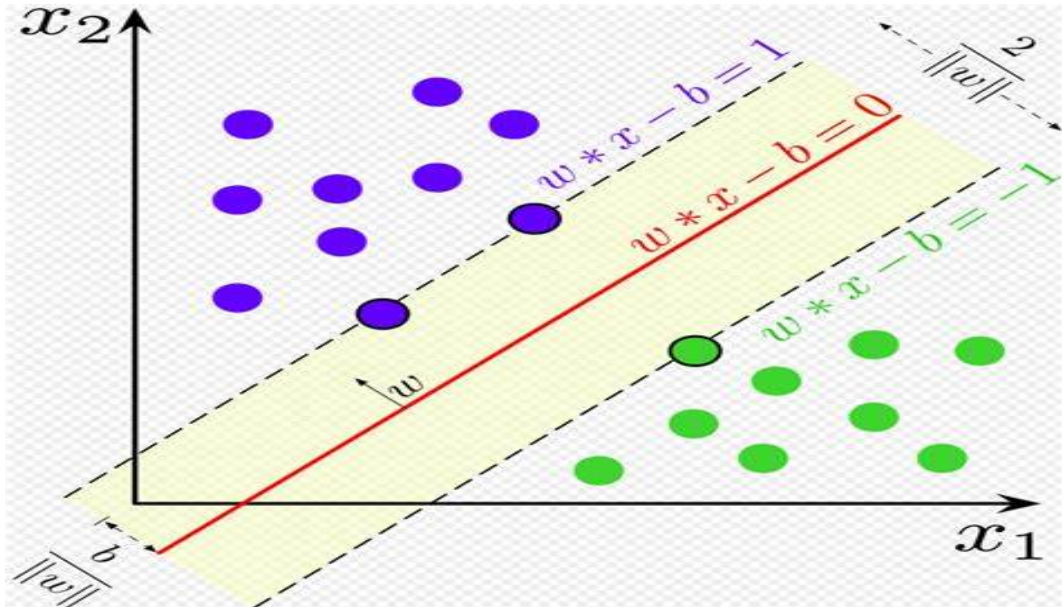


Figure 4.3: SVM

4.4 Do prediction on live camera

we can test our faces with or without mask and check whether this algorithm is able to identity you that you are wearing a mask or not.

Chapter 5

RESULT AND FUTURE ENHANCEMENT

In order to determine if a user is wearing a mask, Face Mask Detection Platform uses Artificial Networks. The app can be integrated with any existing or newly installed IP mask detection cameras to confirm whether people are wearing masks. An administrator can also receive notifications if a face is unrecognized by the camera or if a mask is not worn. The app users can add their faces and phone numbers to the app for automatic alerts.



Figure 5.1: without mask

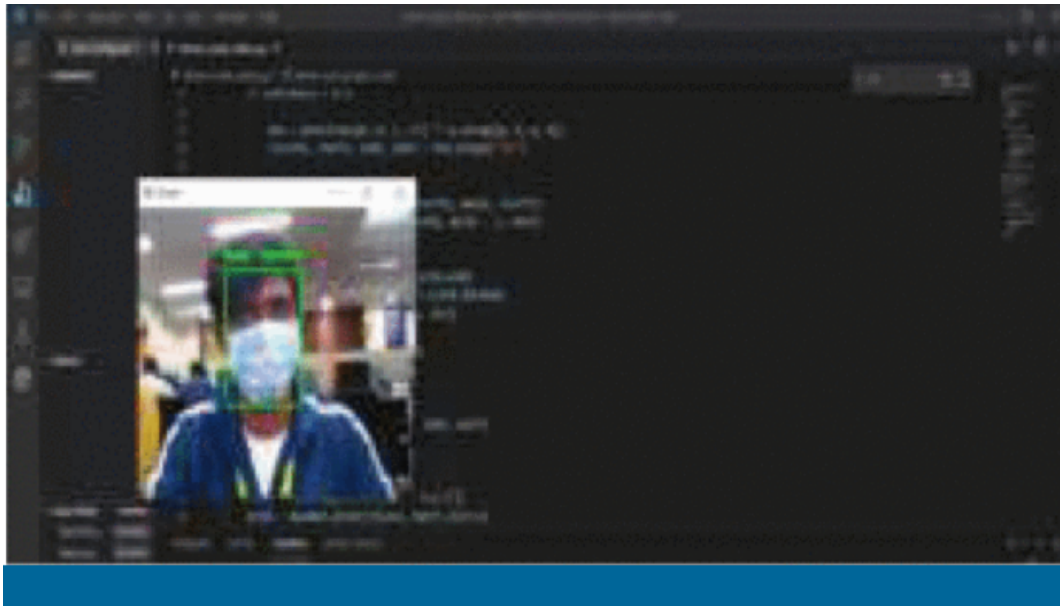


Figure 5.2: with mask
labelfig

Chapter 6

Conclusion

This paper proposed a real time mask detection system to maintain safety standards for COVID-19 using Python and TensorFlow. Machine learning based is developed and implemented to detect if someone is wearing a mask or not. Using the mask detector model, a person's mask status can be detected. First step of the recognition system is to train the model and compare the captured image (via webcam feed) with trained datasets to identify the mask on face. To implement the system in real time scenario, train the datasets is a challenging task w.r.t dependency factors like different type of mask, angle of view, image resolution, size, clarity of image, day and night variations of lighting, motion blur, different facial expression, and bounded region of face. To overcome the complexity of the existing system the proposed solution combines the features of Open CV, TensorFlow to increase the accuracy of the system. The proposed system includes object detection, feature classification methods to identify the mask on user face. The result evaluation of proposed pre-trained face mask recognition model shows better performance when compares to the existing face mask detection methods. This proposed method attains the accuracy of scanning face up to 96.88. Further, several possible improvements can be implemented in the real time system in the future.

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