

Face Mask Detection Using Raspberry Pi

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ABSTRACT:

In an international health crisis, the COVID-19 pandemic reasons a success safety strategies to camouflage public areas around the world (WHO). The COVID-19 pandemic pressured nations around the arena to halt the transmission of viruses. Reviews propose that it extensively lowers the hazard of transmission with the aid of transporting face masks at paintings. Green and in your price range approach to Raspberry PI victimisation to construct a secure surroundings at some stage in manufacturing operations. Deep and classical gadget getting to know for mask detection is provided for a hybrid model of victimship. There's a mask detection dataset, and while we do not mask pictures, we favor to rectangular degree.

Key Words: Corona virus disease, Face mask detection, Raspberry pi.

1. INTRODUCTION

Detection of face masks can be a tough job. During this period, it received extra attention due to the spread of corona virus disease. This is why various nations adopt the rule "No entry without masking." Facade detection is a critical safety problem and Covid-19 prevention. Masking reduces the risk of the associate of exposure to infected patients, irrespective of the symptoms. The identification of masks is carried out in airports, hospitals, offices and academic areas. The detection of masks has thus become a challenging and highly critical issue. Facial recognition is however quicker if not masked Detection of façades is a key safety issue and prevention of Covid-19. In the medical field, masking lowers the associate's potential risk of exposure to infected patients, whether or not they show symptoms. Airports, hospitals, offices and academic departments are used in mask detection. Mask detection has therefore become an extremely important and difficult problem. However, face recognition with mask is key as the extraction of coated face is incredibly complex compared to conventional face. Facety recognition without masking is simpler. That's such a vast number of facial characteristics as the measurements of the nose, mouth and kidney within the masked face. In the field of medicine, masks lessen the risk of potential exposures to the nursing associate. That's such a vast number of facial characteristics as the measurements of the nose, mouth and kidney within the masked face. The mask in the medical field reduces the associate's potential risk of exposure to infected patients whether or not they have symptoms. So much mask detection is always focused in two steps.

1) Reconnaissance of face

2) Extraction of Feature

The first step is face recognition; we want to find the face from a photograph here. Especially in the nursing unmasked faces in an image, the multiple mask Associate is detected. It is also solved with an old technique of detection of objects. Viola-Jones law, adaptive Boost Algorithm and GROW are the standard face detection algorithms for square metres (Histogram of Gradient). The technique of object detection is here classified as multi-stage detectors and individual short detectors (SSD). Here, a vast number of papers on the measurement of mass detection have been analysed. Many square measurement approaches used for mask detection like video analytics, segmentation of image linguistics.

1.1 DEEP LEARNING

Deep learning approaches are intended to learn hierarchies of characteristics which consist of lower-level characteristics with higher hierarchies Auto-learning features at different abstract levels permit a computer to learn complex functions that map the input directly to the output without relying on human-designed properties Large learning algorithms appear, on several occasions, to use the unknown essence

of the input distribution to distinguish good representations. The hierarchy of concepts enables the machine to learn complex concepts through simpler concepts. The map is depth and consists of several layers if we draw a graph that shows how these definitions have been built up on each other. This is why we call AI deep learning this technique. The input (and also output) are analogic in deep learning in problem areas. This means that they are not just a few tables, but pixel data images, text recordings or audio recordings. They are even tables. Deep learning makes it possible to learn data representation with various degrees of complexity through computer models consisting of several computing layer models.

1.2 OpenCV

open access machine vision and instruction applications library (Open Source Computer Vision Library). OpenCV has been developed for a popular computer vision infrastructure and for rapid use in consumer products of machine perception. As a BSD-licensed software, OpenCV encourages the use and alteration of the code by enterprises. The library has more than 2,500 integrated algorithms that include both traditional and advanced computer vision and machine learning algorithms. These algorithms can serve for detecting and recognising images, for identifying objects, classifying human activity in images, for tracking camera movements, for tracking moving objects, for extracting objects' 3D models, to create stereo camera-based 3D point clouds, to generate pictures in high resolution of the entire scene. OpenCV has over 47,000 user group members and is estimated to have over 18 million downloads. In businesses, consulting associations and government agencies, the library is widely used. In addition to existing library-employed companies such as Google, Yahoo, Microsoft, Intel, IBM, Sony, Honda, Toyota, several startups are now working with OpenCV, such as Applied Minds, Video Surf, and Zeitera. OpenCV's use includes the following areas: gathering street views, detecting intrusions into Israel's camera surveillance, monitoring China's mining machines, allowing robots to manoeuvre and gather items at Weillow Garage, detecting pool drownings in Europe, running in Spain and New-York interactive art, monitoring debris runways in Turkey, checking pro labels in the field of traffic. It supports Linux, Windows, Mac OS and Android, and has Java, Python, C++ and MATLAB interfaces. The OpenCV uses MMX and SSE instructions where available, mostly in real time vision applications. Right now there are actively built a fully-fledged CUDA and OpenCV interfaces. There are more than 500 algorithms and about ten times the number of algorithm functions. OpenCV is native to C++ and contains an interface template with STL containers which works seamlessly.

1.3 TENSORFLOW

TensorFlow is an open source free data flow software library and a differentiable programming library that can cover a number of tasks. It is a symbolic math library that is also used by apps like neural networks. TensorFlow is Google Brain's second-generation framework, for analysis and development on Google. On February 11, version 1.0.0 was released, TensorFlow can operate on several CPUs and GPUs (with optional CUDA and SYCL extensions on graphical units for general purpose computing), while the Reference Code is running on individual computers.

TensorFlow is usable on 64-bit Linux, MacOS, Windows and handheld devices, such as iOS and Android. Its modular architecture facilitates the fast deployment of computing systems from desktops and server clusters to handheld and edge computers, on a range of platforms (CPUs, GPUs and TPUs).

The term Tensor Flow derives from activity in multidimensional data arrays known as tensors conducted by neural networks. On a Google I/O conference in June 2016, Jeff Dean reported on TensorFlow, which included only five Google repositories, to 1,500 GitHub repositories. Unlike other numerical libraries planned to be used in the field of deep learning such as Theano, TensorFlow was designed for use in research and development as well as in manufacturing systems. It can run on a single CPU, GPU and mobile devices, and on hundreds of large-scale distributed systems.

1.3 KERAS

Keras is an API for people, not robots. Keras is compatible with basic APIs, minimises the amount of user actions needed for typical uses, delivers transparent and operative error messages and uses best practises to reduce cognisant load. It also contains detailed materials and developer guides. Included in Keras are numerous implementations of widely-used neural network building blocks such as layers, targets, activation functions, optimizers and several methods for easy code writing using image and text data for the depth of neural network code. Code is stored in GitHub and the GitHub issue page is used in help forums, as is a Slack Channel. Keras is a minimalist, deep learning Python library that can be used on top of Theano or Tensor Flow. It was designed to allow research and development to adopt profound models as quickly as easily as possible. It is available on Python 2.7 or 3.5 and can run smoothly with the underlying frames on GPUs and CP Users. It is published in the MIT permit.

3 EXISTING SYSTEM

Wearing mask all the time in our everyday activities has not yet found an eternal place. It's natural to be content with, and to get rid of, mask, not to merely relax and breathe correctly while chatting, operating, or once extended. Thus, the risk of one's own life is not only limited, but WHO may need to collectively contact the human being as soon as he/she has not been a sports mask. Currently, an examination of people with and without mask is conducted by sentries/guards at entry/exit points manually and visually. Guards/Sentries cannot be placed anywhere to verify people who take their masks and wander when they are not restrained until they have to be checked on the entrance door

2 PROPOSED SYSTEM

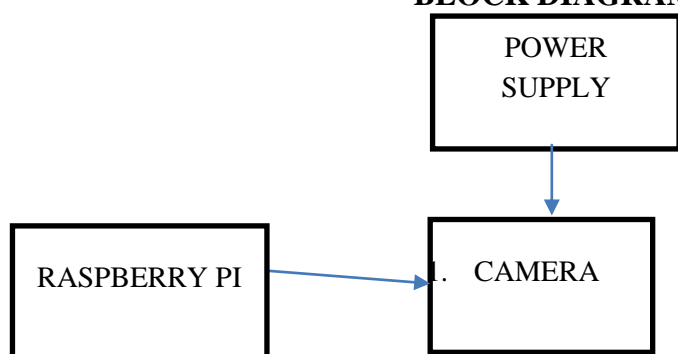
With the assistance of Computer Vision and PI Raspberry, attempts were made in the proposed system to check individuals without and with masks automatically. This module detects the person's face, determines whether the person wears a mask or is not wearing a mask, and alert the person if the mask is not used.

The emphasis is on how to find the person on an image/video stream with face masks by using the OpenCV, Tensor Flow, Keras and PyTorch library, using machine vision and a deeper learning algorithm.

Approach

1. To Train Deeper using learning model
2. To apply mask detector into pictures/ live video stream.

BLOCK DIAGRAM

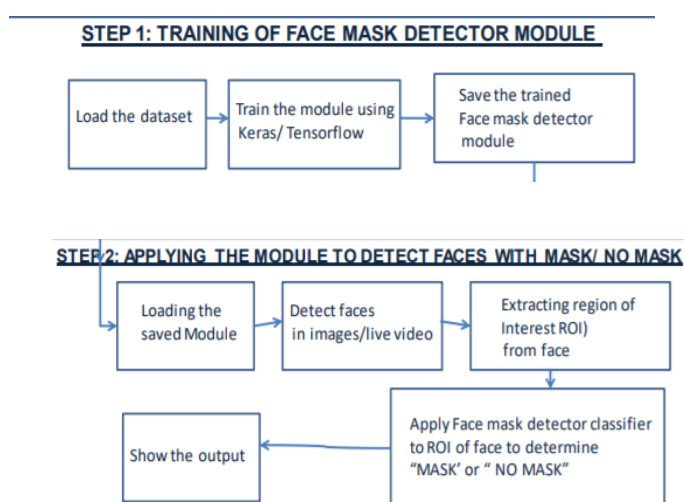


4 WORKING PROCEDURE

A portable, lightweight camera that supports Raspberry Pi may be the Pi Camera module. The MIPI camera serial interface protocol communicates with the Pi victimisation. It is unusually used in image process, machine learning or in police inquiry. The police investigation drones are commonly used because camera payloads are relatively low. The area units used with PC may even be used with the exception of such modules, Pi uses conventional USB webcams. We have to tackle the Pi to change the Camera while we interface the hardware. To open the setup window, use the command "sudo raspi-config." Then change the camera under interfacing options. Restore the Pi and your module for the camera is ready to be used. You will then make the Pi for photographs or video recording. Easy python scripts victimization.

4.1 WORK FLOW DIAGRAM

At first, a model with hundreds of pictures, both masks and not masks, is trained here. The model distinguishes between faces with/without mask.



4.2 HARDWARE UNITS:

4.2.1 RASPBERRY PI:

Raspberry Pi is a lightweight, credit card-like device. Includes a multi-core, GPU, RAM DDR, ROM, I/O, Ethernet, Host and a very limited HDMI processor. It is also included in the processor. Compared with modern day computers and notebooks, the Raspberry Pi is relatively sluggish, but with low power usage it can fulfil demands from a right Linux framework. The company is able to link to the world outside and is used in diverse areas of automated manufacturing ventures, music machinery, meteorological stations and indoor tweeting rooms. It's a hardware that is available. Most raspberry pi projects are available and bui can be also opened. The majority of raspberry pi projects are available, and can be both manufactured and updated by ourselves. The picture collected by the camera is processed.

4.2.2 CAMERA:

The camera captures the live streaming photos. Then these frames are analysed and the result obtained



Fig1 : Camera connected with Raspberry pi

RESULT

A video stream display person carries or does not hold a mask.



Fig 2: With Face Mask



Fig 3: Without Face Mask

APPLICATION

- At the start-up entry/exit point. Relieving sentries from extra tasks.
- Points within offices are located properly.
- Bureaux.
- Measurement/Institutions.
- Shopping Center • Juice Shops • Walking Square •
- Hall. Audience.
- Seminar rooms.
- Any location where the mask is required.

CONCLUSION

In COVID situations, the current scenarios and the increase are an unsettling situation. The mandate of carrying a mask must be checked every time and every time out of home by all establishments/offices. The use of technology would not only automate the detection task but avoid the reversing of considerable work force by manually checking defaulters rather than manual checks.

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