

AI BASED FACE MASK RECOGNITION WITH RFID TRACKING SYSTEM

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Abstract: People were seen breaching the lockdown and not following social distancing by crowding in public places such as fish market, Supermarket, etc. The World Health Organization (WHO) recommends the following measures to suppress transmission of virus and save lives: Wearing face masks, social distancing and frequently cleaning hands with Sanitizers. Security personnel in Supermarkets and malls perform duties including enforcement of physical distancing norms and regulation at market places. But still the spreading of viruses is gradually increasing day by day.

Key Words: Face Mask, RFID, CNN, AI

1. INTRODUCTION

Covid sickness (COVID-19) is an irresistible infection brought about by a recently discovered coronavirus. A great many people tainted with the COVID-19 infection will encounter mellow to direct respiratory sickness and recuperate without requiring unique therapy and recover without requiring special treatment. More seasoned individuals, and those with hidden clinical issues like cardiovascular sickness, diabetes, chronic respiratory.

Contamination, and threatening development will undoubtedly make authentic illness. The best way to deal with prevent and ruin transmission is to be a lot of taught about the COVID-19 contamination, the affliction it causes and how it spreads. Shield yourself just as others from defilement by washing your hands or using an alcohol based rub occasionally and not reaching your face. The COVID-19 contamination spreads basically through globules of spit or delivery from the nose when a polluted individual hacks or wheezes, so it's critical that you furthermore practice respiratory etiquette.

2. Face Mask Recognition

The objective of face mask recognition is to decide whether the person wearing mask or not. Each face is encased by a bouncing box to identify the persons face with mask or without mask. Peoples change for instance outward appearance, direction, lighting conditions and incomplete impediments, for example, shades, scarf, and cover.

The result of the detection gives the face area boundaries and it very well may be needed in different structures, for example, a square shape covering the focal piece of the face, eye focuses or milestones including eyes, nose and mouth corners, eyebrows, nostrils, etc. In this Facial mask recognition system it detects whether the person has a mask or without a mask. This application alerts the security personnel when a visitor is not wearing a mask automatically.

2.1 Artificial Intelligences

Artificial intelligence (AI) is a broad field of computer science that focuses on creating intelligent the machines can execute functions that would or require human intelligence. While AI is a multidisciplinary science with many methods, advances in machine learning and deep learning are causing a paradigm change in nearly every field of the tech industry.

In AI (Artificial intelligence) it is also used for image classification or image processing. Image processing is classified into two methods they are known as Analog image processing and Digital image processing.

2.2 Deep Learning

Deep Learning is the technology that imitates the working of human brain and it process the data and creating the patterns. It is mainly used for decision making like has human brain works.

Phase 1 - it build and train the module first in Phase 2- Deploy face mask detector over the particular images or live videos (streams) these two phases are used train and deploy the image.

2.3 Convolutional Neural Networks (CNN)

A convolutional neural network (CNN) is a group of artificial neural network. It used in image recognition and it is exactly designed to process the pixel data. CNN it is powerful in image processing. When the image is inputted to this process the image pass through three layer to classify the given image.

3. RFID Tracking System

RFID(Radio Frequency Identification) In this the RFID Tracking System is used to track the particular person using electromagnetic fields to automatically identify and track the tags that are attached to the person or an object. An RFID consist of a components called tiny radio transponder, radio receiver and transmitter.

RFID tracking system data is sent and received by the system consisting of RFID tags, antenna, RFID reader, and a transceiver.

Using this RFID tracking system we can track the persons by using tags and receiver. Using RFID the persons have wear the tags by hand bands or id tags, once the tag read by the reader it starts to track the person by collecting the data and the person were ever goes inside the mall the RFID has attached to the GPS module to track the person in the indoor (it is used for indoor tracking)

When the person have any issues using the application that inform to the securities, they can easily identify or tack the person and solve their needs and problems.

4. Proposed System

Facial mask recognition system is a technology that detects whether the person has a mask or without a mask. This application alerts the security personnel when a visitor is not wearing a mask automatically.

4.1 Objective

The main objective of the proposed system is to provide an enhanced virus prevention and security system for shopping malls which incorporates the following features:

- Automatic face mask recognition to detect whether the visitor is wearing a mask or not, and
- RFID based tracking system.
- Web Application
- Server database

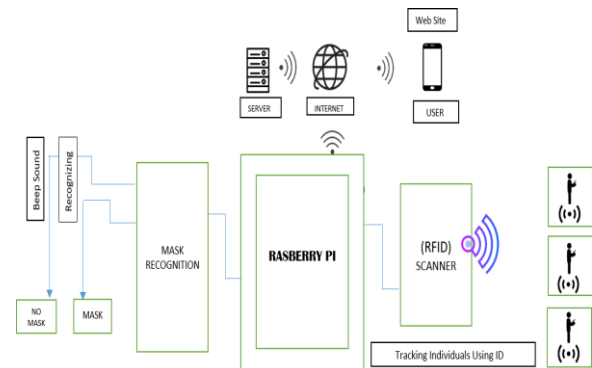


Fig-1: Block diagram

In this above diagram represent the proposed system of the project. The first is the face mask recognition that detects the person entering into the mall wearing mask or not. If the person is not wearing the mask it will alerts the person immediately by using AI technology .it classify the image using image processing method to identify the faces wearing mask or not. The working process of the face mask in CNN is in three process they are Convolutional layer, pooling layer, fully connected layer.

In the convolutional layer the image is pass through the set of learnable filters it is called kernels. It is a small receptive field and it is extend through the full depth of input image (volume). It divides the image dimension 5x5x1 matrix to the kernel as 3x3x1 matrix order to find the full depth input volume of the image.

The Kernel are used to shift 9 times for the stride length (1) and it performs multiplexing operation of K between the portions P of the image over the kernel is hovering.

And the filter it will move right to find the stride value till the phrase complete the width and it will hops down to the starting and to moves on left to certain stride value. The process will continue until the image is fully traversed.

Then it passes through the next layer Pooling. It is another building block of CNN. In this process it reduce the spatial size of the inputted image and to reduce the parameter and computation of the network. This layer operates each feature map independently. In this process it approach the max pooling, In max pooling it returns the maximum value of the image that is covered by the kernel and on other hand the average pooling it returns the value of the image that covered by the kernel. In max pooling it perform mainly for Noise suppressant. It discord noise activation on the inputted image and it performs de-noising along dimensionality reduction.

Average pooling performs dimensionality reduction of an image. Then the inputted image from pooling layer is

passes through the next layer called fully connected (FC). In this it forms the last few layers in the network.

The last layer is the output from final pooling or the convolutional layer that can be flattened and fed to the FC layer (Fully connected). It converts the image into a suitable form and it flatten the image into column vector.

Then the output of flattened is fed to feed-forward neural network and the back propagation is applied to the every iteration of the training, and to classify the low-level feature image it use the Soft max classification technique.

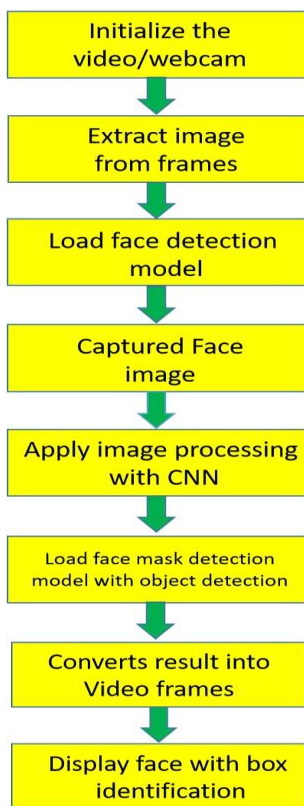


Fig-2: Algorithm

In this algorithm the image or video has imported through webcam and it extract the image from frames to process and it load the face detection model and it recognize the given face image.

And it apply with the CNN process to classify the image by layers after that it load face mask detection model with the object detection to identify the face with or without mask after the checking process it converts into video frame and it displays the face of the person by box identification of mask no mask.

Next it has the IR body temperature and the automatic hand sanitizer so the person entering into the mall or other places it will be used to prevent from viruses. In this next as RFID, This tracking system that tracks the person in this method.

it includes GPS to track in door objects or a person inside malls while entering into the mall the person were provided by RFID tags in the of method label or a wrist bands or an id tags this tags are read or scan by the RFID scanner.

And it store the data about the tags like serial number or by storing the data about the person name or phone number. Then they person will be tracked.

And it also consist of an android application using this we can easily alert the persons who not wearing mask inside the mall or any other premises .And it also used for RFID tracking and some features are included.

5. System Implementation

In this system we are implementing Facemask recognition and website to monitor whether the peoples are wearing mask or not .using hardware and software components the process as implemented.

- Raspberry Pi with Camera for Face mask Recognition
- RFID Tracking system
- Web Application
- Server Database

5.1 Raspberrypi

The Raspberry Pi is a small, low-cost device the size of a card that connects to a computer monitor or television and uses a regular keyboard and mouse.

It's a capable little gadget that allows people of all ages to learn about computers and programming languages like Scratch and Python. It can do all a laptop machine can, including surfing the internet and playing games.



Fig -3: Raspberry pi

5.2 Raspberry pi camera module

The camera is compatible with all Raspberry Pi versions 1, 2, 3, and 4. It can be accessed through the MMAL and V4L APIs, and numerous third-party libraries, such as the Pi camera Python library, have been developed for it. It represents a significant improvement in image quality, color fidelity, and low-light efficiency. It has video modes of 1080p30, 720p60, and VGA90, as well as still capture. It connects to the Raspberry Pi's CSI port via a 15cm ribbon cable.

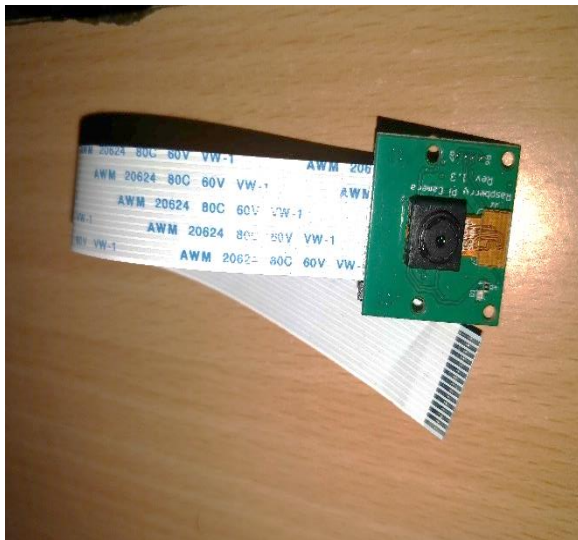


Fig -4: Raspberry pi with Camera

5.3 OpenCV

OpenCV stands for (Open Source Computer Vision Library). It is used to develop real time computer vision application. OpenCV supports programming languages java, python and etc.

It is very capable of processing image and video to identify the object and it is also available on different platform windows, Linux, and android IOS.

In computer vision it will take input image and the output image scene (recognize objects, and images) through the method of CNN. And image processing is the method used in computer vision along with CNN.

The process of the OpenCV in image processing is first it input image or a video and it convert and stored into number format.

The pixel values of image is convert into numbers it is the smallest unit of the digital image the intensity of the picture is represent as numbers the process of the OpenCV is the format of (blue,green,red) as BGR.

Next in OpenCV the gray scale image in this the white color is represent as 255 and the black color represented as 0.

5.4 Website

A website is a series of interconnected, publicly available Web pages with a single domain name. Individuals, groups, businesses, and organizations may build and maintain websites for a variety of purposes.

6. Result

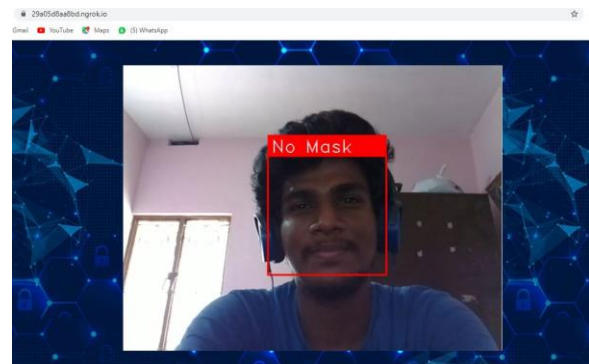


Fig -5: Output result No mask

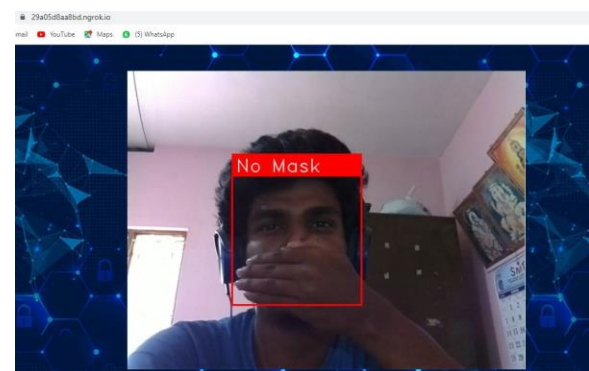


Fig -6: Output with hiding hands on face

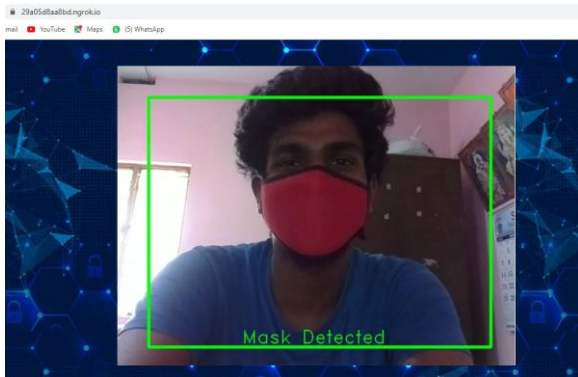


Fig -9: Output with Mask

7. Conclusions

At the outset of this paper, we briefly explained the motivation for the work. The approach has achieved a reasonable level of accuracy using simple machine learning methods and simplified techniques. Given the Covid-19 crisis, wearing a mask may become mandatory in the near future. Many government agencies will require consumers to wear masks appropriately in order to use their services.

The implemented model would make a significant contribution to the public health care system. It could be extended in the future to detect whether or not an individual is wearing the mask properly. The model could be developed further to detect whether the mask is virus-prone or not, i.e. whether it is surgical, N95, or not.

The proposed system RFID technology is to monitor people's whereabouts. RFID systems use the reader's emitted radio waves to wirelessly transmit tag data to a host computer. The tag information from tags inside the reader's wireless range is stored in the server database. The identification of a passive tag attached to an asset is IEEE Control and System Graduate Research Colloquium (ICSGRC 2020), 8 August 2020, Shah Alam, Malaysia

the basis for this indoor tracking device. A tag can be identified from a distance of up to 10 meters using high frequency passive tags. Active tags with a higher frequency have a greater range (up to few hundred meters). When compared to active tags, the passive tags used in this scheme are less effective and expensive.

As a result, the device offers a cost-effective position monitoring solution.

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