

Survey on Face Mask Detection with Door Locking and Alert System using Raspberry pi

Utkarsha Barde¹, Dhanshree Kadam², Manasi Patil³, Kirti Shirnath⁴

^{1,2,3,4}Student of Pune Institute of Computer Technology

Abstract - The transmission of covid-19 disease increases rapidly. So according to the World Health Organization (WHO), one of the effective measures to protect against corona virus is wearing a facemask in crowded areas. A face mask detection system dataset consists of the various images of people with mask and without mask. We are going to use pi cameras for real time face detection. We are going to use the Kaggle dataset to build a COVID-19 face mask detector with computer vision using Python, OpenCV, and TensorFlow and Raspberry pi. The main goal of this system is to identify whether the person on video stream is wearing a face mask or not. and If the system found any person without mask then an alert would be provided to him/her by using buzzer and the door of a particular organization would not get open until he wears mask.

Key Words: CNN, Raspberrypi, Neural Network, Buzzer, Pi camera

1. INTRODUCTION

Many people in the world are suffering badly due to COVID-19 pandemic as it is spreading at a higher rate. Thousands of people are dying globally day by day because of corona virus. According to WHO it is a respiratory illness that cause severe pneumonia in person infected by COVID-19[11]. This disease is acquired through droplets of an infected person, when the infected person coughs or sneezes the virus enters into the person's body through droplets of the victim. It penetrates into the body at the time of breathing. When you touch the contaminated surface then also the chances of entering a virus in the body increases[12] through mouth, nose or eyes.

Persons with a weak immune system, elderly people and those having health complications like heart diseases, diabetes, respiratory diseases and cancer patients are vulnerable to this virus.

The spread of virus can be limited by following the rules of social distancing and also acquiring the habit of wearing mask. Facemask detection system through artificial intelligence will prove beneficial to everyone for recognizing people with masks or not. On the other hand, it will be challenging to recognize whether people has wear masks by any monitoring systems. So, by taking into account we are going to develop a system to check whether the person is wearing a mask perfectly or not. If

the system finds a person without mask then buzzer will sounds to notify the person that he/she is entering without mask and he/she should wear a mask otherwise the door will not get open

1.1 Literature Survey

Over the period there have been numerous headways in profound learning towards object identification and acknowledgment in different application spaces. As a rule, the majority of the works center around picture remaking and face acknowledgment for personality confirmation. However, the primary point of this work is to distinguish individuals who are not wearing veils out in the open spots to control the further transmission of COVID-19.

Md. Sabbir Ejaz et al.(2019) carried out the Principal Component Analysis (PCA) calculation for veiled and unconcealed facial acknowledgment. It was seen that PCA is efficient in perceiving faces without a cover with an exactness of 96.25% however its precision is diminished to 68.75% in recognizing faces with a veil.[1]

Bosheng Qin and Dongxiao Li (2020) have planned a face cover ID strategy utilizing the SRCNet arrangement organization and accomplished a precision of 98.7% in grouping the pictures into three classes to be specific: right face veil wearing, wrong facemask wearing and no face cover wearing[2].

Li et al. utilized YOLOv3 for face identification, which depends on profound learning network engineering named darknet-19, where WIDER FACE and Celebi data sets were utilized for preparing, and later the assessment was finished utilizing the Fddb information base. This model accomplished a precision of 93.9%[3].

In a comparative examination, Nizam et al. proposed a GAN based organization engineering for the evacuation of the face veil and the remaking of the locale covered by the cover. Rodriguez et al. (2015) proposed a framework for the programmed discovery of the presence or nonattendance of the obligatory careful veil in working rooms. The target of this framework is to trigger alerts when a staff member isn't wearing a mask. This framework accomplished a precision of 95%. [4]

Loey et al., proposed a model that comprises two parts utilizing ResNet50 for highlight extraction. The next part is

facemask classifier, based on an outfit of old style AI calculations. K. Yan, S. Huang, Y. Melody, W. Liu and N. Fan, created 'Face acknowledgment dependent on convolution neural organization' [5].

Rodriguez et al. (2015) proposed a system for the automatic detection of the presence or absence of the mandatory surgical mask in operating rooms. The objective of this system is to trigger alarms when a staff is not wearing a mask. This system achieved an accuracy of 95%. [6]

Mohamed Ali Hajjaji, Safa Teboulbi, Seifeddine Messaoud implemented AI-Based Face Mask Detection and Social Distancing Measuring System for COVID-19 Prevention [7].

R. Suganthalakshmi, A. Hafeeza proposed a model having four modules. The proposed model having surveillance cameras to detect faces and is a combination of opencv, tensorflow and keras. The system achieves the highest accuracy and consumes less time. The system uses architectural features of VGG-16 as the foundation network for face recognition [8].

Jason Dsouza designed a system with two stage architecture for detecting masked and unmasked faces. First stage have trained RetinaFace model for robust face detection, after comparing its performance with Dlib and MTCNN. Second stage have the NASNetMobile based model was selected for classifying faces as masked or unmasked [9].

Meghana Shinde, Soham Vaidya proposed a system "Facemask detection Alert System using Raspberry pie" in April 2021. The proposed system detects the face with mask or not and the person without mask gets an email with the screenshot that he has not worn the mask [10].

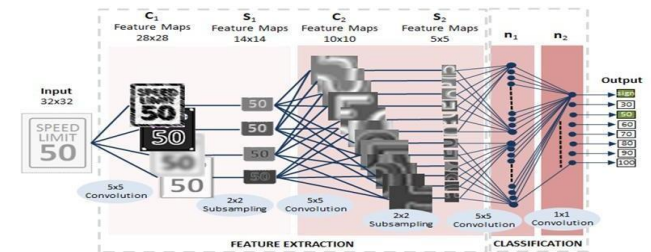
Following from the above setting it is obvious that exceptionally for cover discovery extremely set number of examination articles have been accounted for till date though further improvement is wanted on existing methods. So, we will create a facemask finder framework utilizing Raspberry pi. In our framework we will utilize bell which will sounds when an individual without mask is distinguished external the entryway of any association. Additionally the entryway won't open until the individual wears the mask.

2. Proposed Methodology

CNN (Convolutional Neural Network)

A convolutional neural organization (CNN) is a particular sort of counterfeit neural organization that utilizes perceptrons, an AI unit calculation, for managed learning, to dissect information. Most regularly applied to dissecting visual symbolism. In light of their common loads, design

and interpretation invariance qualities. CNN has applications in picture and video acknowledgment picture arrangement, clinical picture examination, and NPL.

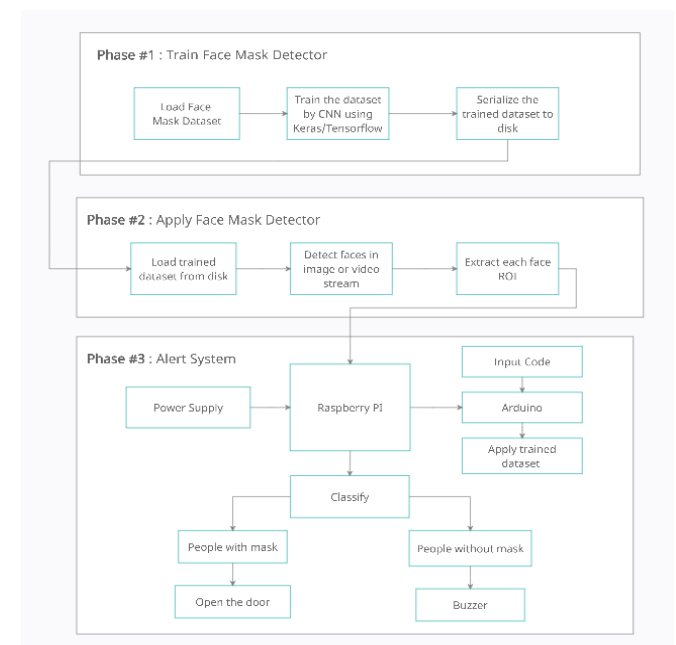


A ConvNet can effectively catch the Spatial and Temporal conditions in a picture through the use of important channels. The design plays out a superior fitting to the picture dataset because of the decrease in the quantity of boundaries included and reusability of loads.

3. System Architecture / Workflow

The dataset comprises certain pictures with face mask and without face mask. All pictures are separated from Kaggle datasets. By parting these datasets pictures into: preparing, test and approval of dataset.

The motivation behind parting is to stay away from overfitting. The testing set will be a subset of the data set to prepare the model.



It mainly comprises of three phases:

I. Training:

First loading the face mask identification dataset from disk, preparing a model (utilizing keras/TensorFlow) on this dataset, and afterward serializing the face mask

detector to a disk.

II. Deployment:

Once the first step is completed we can then move on to loading the mask detector. When Region of Interest is separated, we will give this stage as contribution to Raspberry PI. For setting up the CNN model we fit our photos in the arrangement set and test set to progressive models using keras library.

III. Alert System:

With the help of arduino where input will be face mask classifier/ input code. It will be applied to ROI and results will be fed back to Raspberry PI. Hence, Raspberry PI can take decisions accordingly as with masked or without masked. Further, if the person is wearing a mask the door will open. On the other hand, if a person is not wearing a mask then a buzzer would give a notification.

4. CONCLUSION

In this paper, we proposed an application to detect face masks in crowds and alert the organization if any individual is not wearing the mask and only opening the door when wear. As indicated by the COVID-19 measurements distributed by numerous nations, it was noticed that the transmission of the infection is more in crowded regions. Many exploration contemplates have given that wearing a mask in open zones will diminish the transmission pace of the infection. In this way, the administrations of different nations have made it obligatory to wear masks in the open places and crowded zones. It is extremely hard to screen crowds at these spots. So in this venture, we propose a profound learning model that recognizes people who are not wearing masks. We can additionally improve our system to detect if a person is just putting his hand over face or actually wearing a mask.

REFERENCES

- [1] Ejaz, M.S., Islam, M.R., Sifatullah, M., Sarker, A.: Implementation of principal component analysis on masked and non-masked face recognition. In: 2019 1st International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT). pp. 1{5 (2019)
- [2] Bosheng Qin and Dongxiao Li, Identifying Facemask-Wearing Condition Using Image Super-Resolution with Classification Network to Prevent COVID-19
- [3] Li, C., Wang, R., Li, J., Fei, L.: Face detection based on yolov3. In: Recent Trends in Intelligent Computing, Communication and Devices, pp. 277{284. Springer (2020)

[4] A Novel GAN-Based Network for Unmasking of Masked Face, Nizam ud din, Karman Javed, (March 2020)

[5] Loey, M., Manogaran, G., Taha, M.H.N., Khalifa, N.E.M.: A hybrid deep transfer learning model with machine learning methods for face mask detection in the era of the covid-19 pandemic. Measurement p. 108288 (2020)

[6] Nieto-Rodriguez A., Mucientes M., B.V.: System for medical mask detection in the operating room through facial attributes. vol.9117, pp. 138{145. Springer (2015)

[7] Real-Time Implementation of AI-Based Face Mask Detection and Social Distancing Measuring System for COVID-19 Prevention article by Safa Teboulbi.

[8] R. Sugantha Lakshmi, A. Hafeeza, P. Abinaya, A. Ganga Devi: Covid-19 Facemask Detection with Deep Learning and Computer Vision

[9] Amit Chavda, Jason Dsouza, Sumeet Badgujar, Ankit Damani: Multi-Stage CNN Architecture for Face Mask Detection

[10] Meghana Shinde, Tanvi Sukhadare, Soham Vaidya, Prof. Meghali Kalyankar, Face Mask Detection Alert System using Raspberry Pi

[11] S. Militante, N. Dionisio, "Real-Time Facemask Recognition with Alarm System using Deep Learning", Paper presented at the 2020 11th IEEE Control and System Graduate Research Colloquium (ICSGRC 2020), 8 August 2020, Shah Alam, Malaysia

[12] Jefferson, T. et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. Cochrane Database Syst Rev. 2020 Nov 20;11(11):CD006207. doi: 10.1002/14651858.CD006207.pub5.PMID: 332

BIOGRAPHIES



Utkarsha Barde
Student Of Pune Institute Of
Computer Technology



Dhanshree Kadam
Student Of Pune Institute Of
Computer Technology



Manasi Patil
Student Of Pune Institute Of
Computer Technology



Kirti Shirnath
Student Of Pune Institute Of
Computer Technology