

IOT Based Primary Monitoring System for Covid-19

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ABSTRACT

The quick wide spread of COVID-19 - Coronavirus Disease 2019 has led us to a pandemic all over the world. The most important aspect to control this infectious outbreak is to ensure the correctness of wearing a facemask, but the advantage of facemasks are getting declined because of improper wearing. Throughout this study, we developed a new facemask-wearing status identification method through convolutional neural network and temperature sensing without any physical contact. The proposed algorithm is implemented in Raspberry pi module with a contactless temperature sensor to monitor a person's temperature and as of facemask-wearing status is concerned, it involves three main steps as: pre-processing the image, detection of face and identification of facemask-wearing status. Our findings highlights the high level of accuracy in identifying the facemask-wearing status which can be accomplished by this proposed CNN, which can act as an important application in this pandemic prevention involving COVID-19. It also uses GSM technology to alert the status of person to avoid spreading of COVID-19.

Keywords: Covid-19, Raspberry Pi, temperature sensor, Convolutional Neural Network, alert.

I. INTRODUCTION

Since the most recent days of the year 2019, the event of an irresistible influenza causing respiratory sickness COVID-19, brought about by SARS-Cov-2 infection has influenced pretty much every part of individual's lives by worldwide.

To start with, it was found in China, however it spread rapidly to different landmasses in only a couple of weeks. The normal signs of this Covid infection cover fever, fatigue, sore throat, loss of taste and smell. By and large, it was spread

straightforwardly i.e, from individual to individual through respiratory drops, yet in addition accidentally by means of surfaces. Brooding period could be very long and changes (somewhere in the range of 14 and 27 days in outrageous cases). Moreover, even a symptomless people (practically 45% of cases) can spread the illness and making things even worse.

Accordingly, the utilization of face masks and sanitizers has shown positive outcomes with regards to protection and decline of this disease. Though, the significant issue is the absence of affirmed immunization and drug medication, numerous

insurance and wellbeing measures were taken by governments to decline this disease spread, for example, compulsory indoor facemask wearing, quarantine, social distancing, isolation, self-segregation, restricting resident's movements inside country boundary and abroad and to scratch-off of tremendous public occasions and get-togethers.

In spite of the way that the pandemic appeared to be more vulnerable at certain focuses, the vast majority of security guidelines are as yet applied because of precarious circumstance. From working environment to social relations, game and amusement, Covid sickness presents numerous progressions to our regular everyday practice, propensities and exercises.

In this paper, a practical IOT-based framework intending to help associations regarding the COVID-19 security rules and the rules to diminish this illness spread is introduced. We center on the most basic preventive measures as the individuals with high body temperature level should remain at home and wearing a facemask is mandatory. For the primary situation, a Raspberry pi kit with contactless temperature sensor is utilized, while we depend on an outfitted camera utilizing Convolutional neural network methods for the other situation. We chose to utilize these gadgets because of their smaller size and moderateness.

II. EXISTING AND PROPOSED SYSTEM

A. Existing System

In the existing project, the temperature is measured with the help of a thermal imaging technology while the comparison between the measured temperature and the normal body temperature is done by a person. In case of checking whether an individual is wearing a face mask or not is also done by man power.

B. Proposed System

The events body temperature checking and face mask wearing status are considered as the important predictors for designing the project.

The result recommended in our project is to alert the security guard with a notification as message whenever any abnormalities of temperature or an individual without face mask is detected.

III. DATASET AND MODEL DESCRIPTION

A. Dataset description

The dataset is taken from GitHub created by PyImageSearch reader Prajnash 2020 survey. This dataset consists of 1376 images involving 690 images of people wearing masks and 686 images of people without masks.

It is an excellent dataset for people to learn techniques of deep learning for face mask detection.

B. Model description

Recently deep learning has its own impact in each and every field.

The action recommended is an alert message which takes place based on the high temperature and face mask status.

IV. ARCHITECTURE

A. Hardware architecture

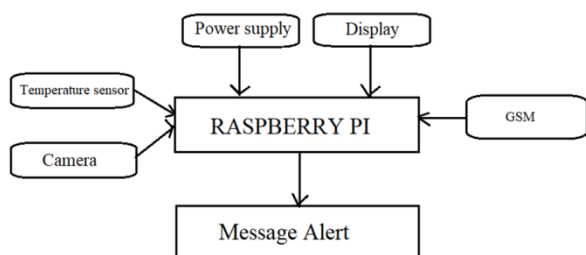


Fig 1 – Hardware architecture

1) Raspberry Pi:

Raspberry pi refers to a hardware with a series of single board computers developed by the raspberry pi foundation which primarily aims to train people and to develop an access in computing education in an easier way. It is of cheap and small sized computer which can be plugged to a computer monitor and are used as a worthy console and mouse. It ensures the people to experience computing and to educate themselves how to perform a program through languages such as python.

2) DS18B20 Water proof Temperature sensor probe

It is well designed to make measurement from a long distance and as they are digital there won't be any degradation of signal while measuring from a long distance. It is of 1 meter long and waterproof based on DS18B20 sensor.

3) SIM800A Quad Band GSM module with RS232 interface

It is a complete Quad band GSM solution in an LGA (Land Grid Array) type which can be embedded in the customer applications. SIM800A support Quad-band 850/900/1800/1900 MHz and it can also able to

transmit SMS, voice, and data information with low power consumption.

4) CNN

CNN technique is a deep learning neural network which uses comparatively less pre-processing than other algorithms involving image classification. Convolutional neural organizations are truly adept at getting on designs in the input picture, like lines, inclinations, circles, or even eyes and faces. It is this property that makes CNN so amazing for computer vision.

B. Face detection and mask recognition system

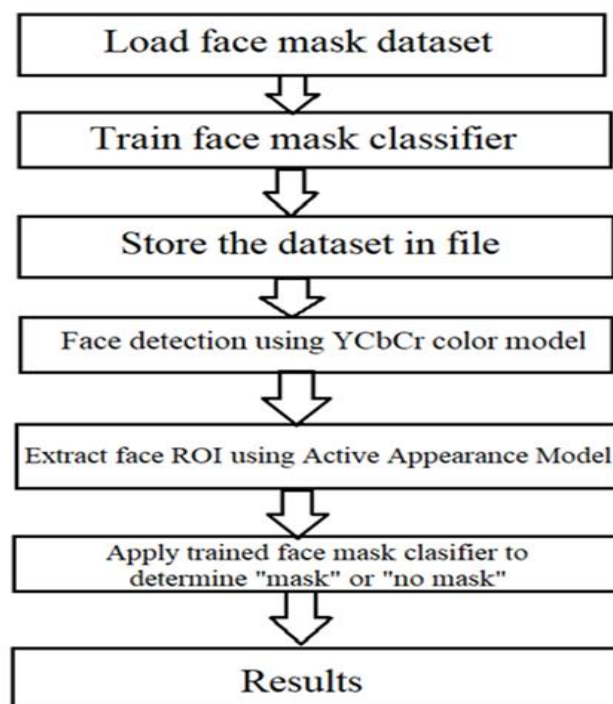


Fig 2 – Architecture of mask detection algorithm

The proposed system involves three stages as: detection of face, feature extraction and recognition of facial mask.

The face detection phases involves the detection of skin color using YCbCr color model to get a uniformity on face and morphological operations to retain the face portion which is required.

The second stage uses AAM (Active Appearance Model) in the output obtained from the initial stage to extract facial features such as eyes, nose and mouth.

The third stage involving mask wearing status, uses a simple Euclidean Distance method. Here, the Euclidean distance is compared between the feature points of the training images and that of the query image. Depending upon the minimum Euclidean distance from the calculated Euclidean distances, the mask wearing status is decided.

This method also includes a temperature monitoring system which can able to achieve temperature measured on a display using raspberry pi as the main control device. An automatic SMS alert using GSM is included if any abnormalities are detected.

V. CONCLUSION

This model is aimed at the measurement of temperature and the detection of mask wearing status with high accuracy. It attempts to perform its function one by one in a fast manner. Thereby preventing the accumulation of people at the entrance. Here the algorithms used are very stable and are compared to check whether the temperature is above the normal body temperature or not and the mask wearing status.

In future, it is planned to test the condition for social – distancing by calculating the distance between two people is enough to prevent themselves from the virus spread. This condition is checked with the help of a fixed threshold value, if the distance between two people is less than the threshold distance value the security guard will get the notification. Also, the goal is to develop the method in this paper with a framework which can be very useful in this pandemic crisis.

VI. REFERENCES

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