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Survey on Smart Entrance System with Machine Learning Technique

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Abstract - *As a result of the outbreak of coronavirus (Covid-19), human contact has become an important risk factor. It is widely believed that the risk of transmission of a virus increases with the greater number of people who come into contact with other objects or persons. World Health Organization (WHO) states that high fever and elevated heart rate are two of the most prevalent symptoms of covid19. Furthermore, it is recommended that we wash our hands frequently and use suitable masks .To detect mask from a person's face a dataset of multiple with and without mask images are created*

Key Words: COVID19, Deep Learning, Open Source Computer Vision, Neural Network, mask detection, temperature

1. INTRODUCTION

China was afflicted with a wide-spread outbreak of the new coronavirus (COVID-19) at the end of 2019 [1]. These viruses are a large family of different viruses causing a wide range of illnesses in humans. Some cause a common cold, others cause migraines, and others are linked to body ache. In the midst of this pandemic situation, everyone's health plays a vital role in their daily lives. However, the vast majority of the population is not aware of how to protect themselves and their surroundings from this threat [2]. Proper mask fitting, physical separation and hand hygiene are important for preventing the spread of the COVID-19 virus. Masks alone do not protect against the virus, and should be used along with regular hand wash and sanitization Due to the rapid spread of the (Covid-19) various countries are facing an epidemic of public health.

For preventing covid,-19 many places have created an entrance system where people manually check a person's temperature, mask and sanitization is provided. This leads to social distance not being observed, also manual checkouts are not feasible in large crowds, and even sanitizing each person is neglected. So we are currently researching the possibility of developing an automatic detection system for facemasks and contact-less temperature checks that will provide individual protection. As such, at least this measure will allow the working population to leave the comfort of their homes to sustain their living, as well as help resolve the economic imbalance that has been brought about by Covid-19. Ultimately, our research led to the development of a fully automated entrance system that consists of a contactless temperature scanner and a mask monitor. A human barrier is directly connected to the scanner. Entrance system is also equipped with an automatic contactless hand sanitizer as well.

The Open Source Computer Vision (OpenCV) framework offers a pre-trained model for recognizing the faces. Using online pictures, the model was trained. The Raspberry Pi 3 receives the facemask data captured by the camera and processes it. This system will use Deep Learning and Computer Vision algorithms to detect individuals wearing a facemask on an image/video stream carried out using different libraries such as OpenCV, Keras, TensorFlow, and others. The photos are categorized as "mask" or "no mask" and obtained from several open source websites The MLX90614 sensor will now be used to measure the temperature [3]. The major objective of this research is to compare the performance of various classifiers and algorithms in terms of mask and temperature detection.

This study, we hope, will aid researchers in their efforts to advance the field of contactless temperature sensing and mask detection approaches. The rest of the paper is laid out as follows. Section 2 discusses the literature on temperature sensing, contactless sanitization, and mask detection methods. Section 3 contains the discussion and conclusion.

2. LITERATURE REVIEW

In [1] Li, Lixiang et. al. investigates study of the Corona Virus Disease 2019 transmission mechanism using official data modeling (COVID-19). Due to its exceptional spreading capacity and potential harm, the new coronavirus has posed a serious danger to people's health and safety all across the world. The study of local and worldwide epidemics, as well as the future development tendency, is a popular issue in contemporary research. Many teams are now researching the COVID-19 transmission legislation and prevention methods. The difference between the official data curve and the model is relatively minor. Simultaneously, it achieved forward prediction and backward inference of the pandemic scenario, with the appropriate analysis assisting relevant nations in making judgments.

In [2] According to K. N. Baluprithviraj et.al. this project proposes an Artificial Intelligence (AI) based smart gadget (Raspberry Pi with AI model and camera) that detects if a person is wearing a face mask and sends us a warning message (via mobile app). A smartphone app is included with this gadget. When people are not physically present in their homes, a mobile app detects whether someone enters their house. This smart gadget only unlocks the door if visitors are wearing a face mask. This gadget may be used at any time of

day or night. It may be utilized in a variety of settings, including malls, stores, hospitals, and temples.

In [3] NaveenKumar K et. al. concluded that there are two key protocols that must be followed in public areas to prevent the virus from spreading further: wearing face masks and maintaining safe social distance. This paper propose a dynamic Computer Vision-based automated solution system focused on real-time face monitoring of people in public places to detect both face mask protocol violations and body temperature using a Raspberry Pi 4 Model B to detect face mask protocol violations through an integrated Pi camera and to monitor body temperature using an MLX90614 sensor to create a safe, COVID-19-free environment. A security clearance system is deployed that will allow that person to enter if they are wearing a face mask and their body temperature is in check with WHO guidelines.

In [4] R. K. Bhogal et. al. proposed a method which is to reduce the amount of time individuals spend manually checking face masks, measuring body temperature, and sanitizing people in public settings. After detecting the human face mask with a camera that uses convolutional neural networks (CNN) and contactless temperature measurement with an infrared temperature sensor, the provided system directs users to disinfect humans using the proposed approach. A person can only enter the tunnel if he or she wears a face mask and has a normal body temperature. If the person is qualified for both, the tunnel allows them to enter and sprays the disinfecting solution all over their body from head to toe.

In [5] Prof. V. M. Bonal P et. al. shown that COVID-19 has harmed over 127 million people globally and killed over 2 million. This study proposes a dynamic Computer Vision-based automated solution system that focuses on real-time face monitoring of individuals and detecting palm print for identification of a person utilizing a Raspberry Pi 3 Model B with an inbuilt Pi camera and an MLX90614 temperature sensor. An Internet of Things (IoT) based electronic mail alert system is being implemented, which will verify if people are wearing a face mask and their body temperature is within WHO standards. This can be implemented in public places such as colleges, schools, offices, malls, etc. to inspect people.

In [6] S. Asif et. al. has experimented to utilize deep learning to recognize face masks in videos automatically. There are two parts to the suggested framework. The first component uses OpenCV and machine learning to recognize and track faces, while the second component processes these facial frames via proposed deep transfer learning model MobileNetV2 to determine the mask region. Using the smartphone camera, the suggested framework was tested on various movies and pictures. The goal of this paper was accomplish real-time detection and classification with high precision. The model has a training accuracy of 99.2 percent and a validation accuracy of 99.8 percent, which is better than other previously suggested approaches.

In [7] Meghana Shinde et. al. has worked on face masks recognition, this project use machine learning, OpenCV, and TensorFlow. Because it is highly resource efficient to install, this paradigm may be used for security purposes. In this method, they have employed the MobilenetV2 architecture, which has a Batch Normalization (BN) layer and is very lightweight, and embedded this model with a Raspberry Pi to conduct real-time mask detection, with Software Structure Drive (SSD) and a light backbone network. Prajna Bhandary and AIZOOTech produced the datasets for this CNN-based face mask identification, which are available on Github. Other researchers can utilize these datasets to develop more complex models, such as face recognition, facial landmarks, and facial component detection.

In [8] According to Ashlesha D. Mahalle et. al. research hand cleaning will assist prevent the transmission of any sickness that spreads by contact. A dependable and cost-effective technique of applying artificial intelligence is created for a healthy working environment in a manufacturing environment. For mask detection, a hybrid model integrating deep and conventional machine learning is to be suggested. A face mask recognition dataset consists of images with and without masks. They have used a Raspberry Pi to recognize faces from a live flow from the webcam in real time. The best applications for infrared thermography sensors are temperature measurement and non-destructive tracking.

In [9] B Varshini et. al. researched the COVID 19 outbreaks which prompted governments all over the world to adopt lockdowns in order to stop the virus from spreading. Wearing a face mask in social places, according to study results, considerably decreases the chance of transmission. In this work, they have presented an IoT-enabled smart door that monitors body temperature and detects face masks using a machine learning model. Any retail mall, hotel, or apartment entry can benefit from the proposed concept. As a result, a cost-effective and dependable technique of utilizing AI and sensors to create a healthy atmosphere has been developed. The Face Mask Detection method, which is implemented in the TensorFlow software library, is used to evaluate the proposed framework.

In [10] Swapnil Kumbhar's et. al. research has shown that the COVID-19 pandemic has pushed us to embrace some changes and made us more cautious. The article provided a solution to the problem. The article proposes an automatic hand sanitizer with a temperature detecting system that allows a person to sanitize their hands anytime they want, without having to touch the sanitizing equipment. When the temperature sensor is touched, it displays the person's body temperature. If the body temperature is normal, the door will automatically open; otherwise, it will remain close.

In [11] Hussain, S. et. al. discussed that the Smart Screening and Disinfection Walkthrough Gate is intended for quick screening, comprising temperature measurement with a

contact-free sensor and the storage of the suspected individual's record for future management and monitoring. Using a transfer learning method, this module categorized persons who wear the face mask appropriately, poorly, and without a face mask using Visual Geometry Group (VGG)-16, MobileNetV2, Inception v3, Residual Networks (ResNet)-50, and CNN. In the mask detection and classification module, they achieved the best accuracy of 99.81 percent using VGG-16 and the second highest accuracy of 99.6 percent using mobileNetV2. They also evaluated the outcomes of their suggested system to state-of-the-art approaches, and their technology, according to the research, might be utilized to avoid local transmission and lower the risk of human COVID-19 carriers.

In [12] Tejaswini N et. al. discovered that detecting face masks has become a critical duty in preventing virus spread and assisting the worldwide population. This paper describes a real-time face mask recognition system that detects whether a person is wearing a face mask and alerts security agencies if he or she is not. Pre - processing the gathered dataset, training the processed information using Convolutional Neural Network (CNN) model, and also using certain Machine learning packages like KERAS, Tensor flow, Open CV, and Scikit-learn are all part of the methodology that they have implemented.

In [13] According to Saman M. Almufti et al. Facemask processing and deep learning areas research, Various methods and strategies have been used to create a variety of face detection models. The proposed method in this paper was created to prevent mask-less people from entering preferred places (e.g., malls, universities, offices, showrooms, schools etc.) by detecting face masks using deep learning, TensorFlow, Keras, and OpenCV and sending signals to an Arduino device connected to the gate to be opened or remain closed accordingly. It detects a person's face in real time and determines whether or not they are wearing a mask and if the mask is worn properly. The technique has a precision of approximately to 97.80%.

In [14] Shilpa Sethi's et. al. research have proven that with the horizon still brim-full, effective ways to manage the COVID-19 pandemic require close attention to reduce negatively impacted community health and worldwide economy. Wearing a mask is one of the non-pharmaceutical intervention techniques that can be utilized as a barrier to severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) droplets ejected by pre-symptomatic or asymptomatic people. In this paper they have created a real-time technique for detecting non-mask faces in public and enforcing the use of a mask. To achieve short inference time and good accuracy, the suggested technique uses an ensemble of one stage and two stage detectors.

In [15], Akshay Sharma A S et. al. has discovered that a non-contact, alcohol-based hand sanitizer dispenser can be automated, and that it may be used in hospitals, work places, businesses, schools, and other locations. Furthermore, it has been demonstrated that alcohol concentrations over 70% were effective in destroying Coronavirus on the hands. It has also been demonstrated that a concentration of alcohol more than 70% can destroy Coronavirus in the hands. In this example, an ultrasonic sensor detects the presence of a hand close to it, while the Arduino Uno is used as the microprocessor to measure the distance, resulting in the pump running.

In [16] Jonathan Lesmana et. al. designed an automated hand sanitizer which is focused on the mechanism for pushing the hand sanitizer's head, which entails a transition from a rotational action to a translational movement. The automated hand sanitizer is designed using the Verein Deutscher Ingenieure (VDI) 2221 approach, which includes an Arduino Nano as the microcontroller, a servo motor as the motor, an ultrasonic sensor for sensing movement in the surroundings, and a rack - and - pinion system for pushing the nozzle from the sanitizer bottle. The automated hand sanitizer concept performed effectively and served as a model for future growth.

3. DISCUSSION

The Covid-19 outbreak has caused a lot of havoc, and people are terrified to leave their homes. So, in order to adjust to the new normal, a fully automatic entry system has been devised that adheres to all safety precautions and provides a secure working environment. We can observe from the review study that machine learning utilizing computer vision and convolutional neural network algorithms is by far the most efficient and accurate. The COVID-19 mask detection and temperature sensing device, if properly implemented, will significantly assure the safety of all persons.

4. CONCLUSIONS

After reviewing various paper, we have seen that mask detection may be done in a variety of ways, such using OpenCV, convolutional neural network(CNN)algorithm, You Only Look Once (YOLO) v4, deep learning, and so on. We've also seen various sanitizers and temperature sensing methods, both of which are fully contactless, as it is necessary for minimizing the effect of covid-19.

We've also seen some of the papers that discuss the project's limitations and potential uses, and we believe that this work will assist a lot of people in getting out of the house and going to places while taking the required precautions.

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