"SOCIAL DISTANCING AND FACE MASK DETECTION USING DEEP LEARNING AS SAFETY MEASURE FOR COVID-19"

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Abstract- According to data obtained by the World Health Organization, the global pandemic of COVID-19 has severely impacted the world and has now infected more than eight million people worldwide. Wearing face masks and following safe social distancing are two of the enhanced safety protocols need to be followed in public places in order to prevent the spread of the virus. To create safe environment that contributes to public safety, we propose an efficient computer vision based approach focused on the real-time automated monitoring of people to detect both safe social distancing and face masks in public places by implementing the model to monitor activity and detect violations through camera. After detection of breach, system generate alert signal.

Keywords – Face Mask, Covid-19, Social Distancing, CNN.

I.INTRODUCTION

The spread of COVID-19 Pandemic Disease has created a most crucial global health crisis of the world that has had a deep impact on humanity and the way we perceive our world and our everyday lives. A novel coronavirus has resulted in person-to-person transmission but as far as we know, the transmission of the novel coronavirus causing coronavirus disease 2019 (COVID-19) can also be from an asymptomatic carrier with no Covid symptoms.

It has spread rapidly across the world, bringing massive health, economic, environmental and social challenges to the entire human population. At the moment, WHO recommends that people should wear face masks to avoid the risk of virus transmission and also recommends that a social distance of at least 2m be maintained between individuals to prevent person to person spread of disease.Furthermore, many public service providers require customers to use the service only if they wear masks and follow safe social distancing. Therefore, face mask detection and safe social distance monitoring has become a crucial computer vision task to help the global society.

II. PROBLEM DEFINITION

Person detection from complex background is challenging task as person have different scale, shape and color, MASK detection tool have challenges such as identifying face with mask, as mask will hide half portion of face. To design and developed a system for social distancing and face-mask detection using DNN(Person Detection), CNN(Mask Detection) and Voila Jones(Face Detection) algorithm.

III . LITERATURE SURVEY

1. Chen Wang,Peter W Horby,Frederick G Hayden, George F Gao **"A novel coronavirus outbreak of global health concern"** www.thelancet.com Vol 395 February 15, 2020.

Chen Wang states that in December, 2019, Wuhan, Hubei area, China, turned into the focal point of an episode of pneumonia of obscure reason, which raised extreme consideration within China as well as globally.Chinese wellbeing specialists did a quick examination to describe and control the infection, including segregation of individuals suspected to have the illness, close checking of contacts, epidemiological and clinical information assortment from patients, and improvement of analytic and treatment systems By Jan-7-2020. Chinese researchers had separated a novel Covid from patients in Wuhan. The hereditary arrangement of the 2019 novel Covid empowered the fast advancement of purpose of care continuous RT-PCR indicative tests explicit for 2019 based on full genome arrangement information on the Global Initiative on Sharing All Influenza Data stage. Cases of 2019 covid are not at this point restricted to Wuhan.Nine sent out instances of 2019 covid disease have been detailed in Thailand, Japan, Korea, the USA, Vietnam, furthermore, Singapore to date, and further spread through air travel is likely.1–5 As of Jan 23, 2020, affirmed cases were continuously detailed in 32 regions, districts, and unique managerial locales in China, including Hong Kong, Macau, and Taiwan.These cases recognized external Wuhan, along with the location of contamination in any event one family bunch detailed by Jasper Fuk-Woo Chan and colleagues in The Lancet and the as of late reported contaminations in medical services labourer's thinking about patients with 2019.

2. Laura Matrajt, Tiffany Leung **"Evaluating the Effectiveness of Social Distancing Interventions to Delay or Flatten the Epidemic Curve of Coronavirus Disease"**pmc article doi: 10.3201/eid2608.201093. Epub 2020 Apr 28.

Laura Matrajt and Tiffany Leung proposed that 1 million people overall were contaminated with serious intense respiratory condition Covid 2.We utilized a numerical model to explore the viability of social separating intercessions in a fair sized city. Intercessions decreased contacts of grown-ups >60 years old, grown-ups 20-59 years old, and youngsters <19 years old for about a month and a half. Our outcomes recommended mediations began before in the scourge postpone the pestilence bend and intercessions began later smooth the plague bend. We noticed that, while social separating intercessions were set up, most new cases, hospitalizations, and passings were deflected, even with humble decreases in contact among grown-ups. Nonetheless, when intercessions finished, the plague bounced back. Our models propose that social separating can give significant opportunity to build medical care limit however should happen related to testing and contact following of all presumed cases to relieve infection transmission.

3. Shixing Chen; Caojin Zhang; Ming Dong; Jialiang Le; Mike Rao**"Using Ranking-CNN for Age Estimation"**2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR).

Shixing Chen introducing human age is viewed as a significant biometric attribute for human distinguishing proof or search. Ongoing exploration shows that the maturing highlights profoundly gained

from huge scope information lead to critical execution enhancement for facial picture based age assessment. Nonetheless,age-related ordinal data is completely overlooked in these methodologies.In this paper, we propose a novel Convolutional Neural Network based structure,positioning CNN for age assessment. Positioning CNN contains a progression of fundamental CNNs every one of which is prepared with ordinal age marks. At that point their paired yields are amassed for the last age forecast.We hypothetically acquire a lot tighter blunder destined for positioning based age assessment. Also we thoroughly demonstrate that positioning CNN is bound to get more modest assessment blunders when contrasted and multi-class grouping draws near.Through broad analyses we show that factually positioning CNN altogether beats other cutting edge age assessment models on benchmark datasets.

4. Shashi Yadav **"Deep Learning based Safe Social Distancing and Face Mask Detection in Public Areas for COVID-19 Safety Guidelines Adherence"** International Journal for Research in Applied Science & Engineering Technology (IJRASET) 2020.

Shashi Yadav introducing cording to information got by the World Health Organization, the worldwide pandemic of COVID-19 has harshly affected the world and has now tainted in excess of 8,000,000 individuals around the world. Wearing face veils and following safe social separating are two of the upgraded well being conventions should be continued in broad daylight puts in request to forestall the spread of the infection.To establish safe climate that adds to public wellbeing, we propose an effective PC vision based methodology zeroed in on the ongoing mechanized checking of individuals to distinguish both safe social removing and face veils openly puts by actualizing the model on raspberry pi4 to screen movement and distinguish infringement through camera.After discovery of penetrate, the raspberry pi4 imparts ready sign to control focus at state police central command and furthermore offer caution to public. In this proposed framework present day profound learning calculation have been blended in with mathematical methods for building a vigorous modular which covers three parts of location, following, and approval. In this way, the proposed framework favors the general public by saving time and helps in bringing down the spread of Covid. It very well may be executed adequately in current circumstance when lockdown is facilitated to examine people in open social occasions, shopping centers, and so forth Mechanized examination lessens labor to assess people in general and furthermore can be utilized in any place.

5. Sachin Sudhakar Farfade, Mohammad Saberian, Li-Jia Li **"Multi-view Face Detection Using Deep Convolutional Neural Networks"** Computer Vision and Pattern Recognition 2015.

Sachin Sudhakar Farfade proposed we consider the issue of multi-see face recognition.While there has been critical exploration on this issue, present status of-the-craftsmanship approaches for this undertaking require comment of facial milestones. for example TSM or explanation of face presents They likewise require preparing many models to completely catch faces in all directions, for example 22 models in Head Hunter strategy.In this paper we propose Deep Dense Face Detector (DDFD) a technique that doesn't need present/milestone explanation and can recognize faces in a wide scope of directions utilizing a solitary model dependent on profound convolutional neural organizations. The proposed strategy has negligible intricacy

dissimilar to other ongoing profound learning object identification strategies it doesn't need extra parts for example, division, jumping box relapse or SVM classifiers.Besides we investigated scores of the proposed face indicator for faces in various directions and found that first the proposed strategy can identify faces from various points and can deal with impediment somewhat and secondly there is by all accounts a connection between's distribution of positive models in the preparation set and scores of the proposed face locator.The last recommends that the proposed strategies execution can be additionally improved by utilizing better testing methodologies and more refined information increase procedures.

IV.EXISTING SYSTEM APPROACH

The work Presented In existing system for person detection hard cascade and hog Christogram of gradient are used in which if persons scale is changed or dot orientation than it cannot detect person image. So performance can be further improved by using better sampling strategies and more sophisticated data augmentation techniques so our approach is using deep neural face detection benchmark datasets show that our single-model face detector algorithm has better performance compared to the previous methods. A novel corona virus has resulted in person-to-person transmission but as far as we know, it causing corona virus disease 2019 (COVID-19) can also be from an asymptomatic carrier with no covid symptoms It has spread rapidly across the world, bringing massive health,economic,environmental and social challenges to the entire human population. At the moment, WHO recommends that people should wear face masks to avoid the risk of virus transmission and also recommends that a social distance of at least 2m be maintained between individuals to prevent person to person spread of disease.

For mask detection in existing system templates are used in our approach rather than template we are using Trained CNN which creates its own feature for example if persons shape or color is changed it will detect which will increase the accuracy level for detection so using CNN is more likely to get smaller estimation errors when compared with multi-class classification approaches.

V.PROPOSED SYSTEM APPROACH

In fig.1 System Architecture of safety measures for covid 19 system .This research is an AI-enabled social distancing detection tool that can detect if people are keeping a safe distance from each other by analyzing real time video streams from the camera. For example, at a workspace, our technicians could integrate this software into your security camera systems to monitor the working environment. With easy calibration steps. The detector could highlight people whose distance is below the minimum acceptable distance in red. The system will also be able to issue an alert to remind people to keep a safe distance if the protocol is violated. Also we are detecting weather person is wearing mask or not. As part of an ongoing effort to keep our customers and others safe, and understanding that the only way through this is with global collaboration, we wanted to share the details we used to develop this software.

We are Proposing an AI-enabled Solution for social distancing detection tool that can detect if people are

keeping a safe distance from each other by analyzing real time video streams from the camera. For example, at a workspace, our technicians could integrate this software into your security camera systems to monitor the working environment with easy calibration steps. The detector could highlight people whose distance is below the minimum acceptable distance in red. The system will also be able to issue an alert to remind people to keep a safe distance if the protocol is violated. Also we are detecting weather person is wearing mask or not.

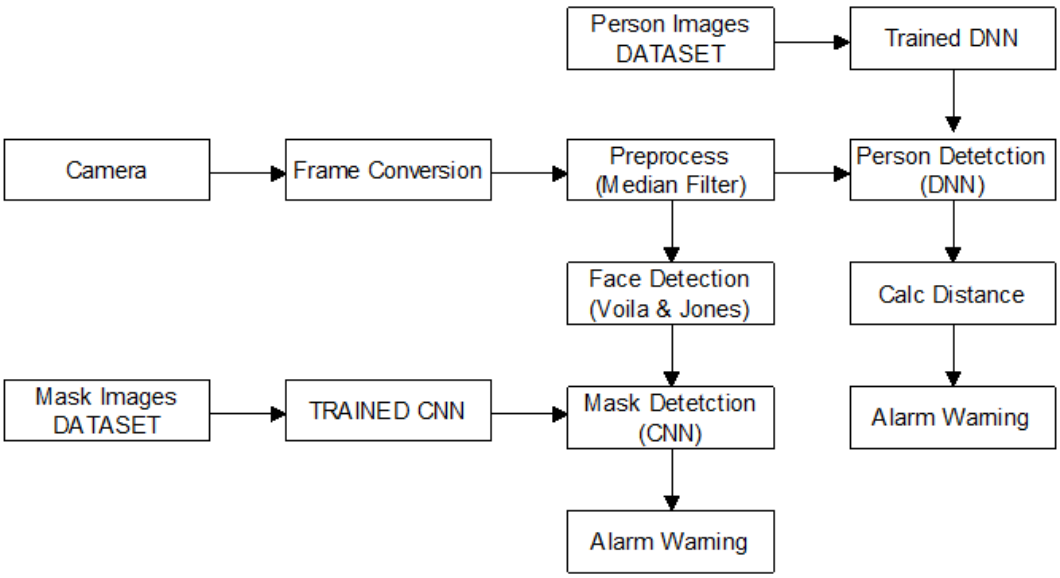

Fig.1 System Architecture of Proposed System

- **Algorithm Used:** Convolutional Neural Network (CNN):-

In proposed work we are using CNN which takes images frames as an input. After getting frames from image it will processed using image processing techniques for feature evaluation. We extract different features from those images regardless of their events in it consists. By using a series of mathematical functions we are going to identify the abnormal events. Every layer in CNN has capability to find out weights of images by using matrix evaluations which converts input to output with valuable functions. Layers of CNN used to identify fire events from extracted frames and give prediction by preserving high accuracy and less time.

Step 1-Input face image

Step 2- Frame extraction from images

Step 3- Image processing by using open-cv

Step 4- Feature Extraction from images

Step 5- Model generation

Step 6- Face detection

VI. CONCLUTION

To help keep a safe climate and guarantee people insurance via naturally observing public spots to evade the spread of the COVID-19 infection and help police by limiting their actual reconnaissance work in regulation zones and public regions where observation is needed by methods for camera takes care of with raspberry pi4 progressively. Subsequently, this proposed framework will work in a productive way in the current circumstance when the lockout is facilitated and assists with following public places effectively in a computerized way. We have tended to top to bottom the following of social removing and the recognizable proof of face covers that help to guarantee human well being. The execution of this arrangement was effectively tried progressively by sending model in raspberry pi4. The arrangement can possibly altogether lessen infringement by continuous intercessions, so the proposed framework would improve public security through saving time and assisting with decreasing the spread of Covid.The system will also be able to issue an alert to remind people to keep a safe distance if the protocol is violated. Also we are detecting weather person is wearing mask or not.This arrangement can be utilized in spots like sanctuaries, shopping complex, metro stations, air terminals, and so on The output will be in the form of Suggested Nutrient Intake & Raw Materials, as well as the Menu Generated.

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