International Journal of Scientific Research in Computer Science, Engineering and Information Technology
ISSN : 2456-3307 (www.ijsrcseit.com)
doi : https://doi.org/10.32628/CSEIT217521

Social Distancing for Covid-19 Monitoring System

Raj Kushwaha, Kismat Khatri, Yogesh Mahato
Department of Computer Science and Engineering, Vellore Institute of Technology, Vellore, Tamilnadu, India

Article Info
Volume 7, Issue 5
Page Number : 49-61

Publication Issue :
September-October-2021

Article History
Accepted : 15 Sep 2021
Published : 30 Sep 2021

ABSTRACT

The battle of corona-virus and mankind is possible to be tackled as long as we maintain the basic norm of social distancing and wearing masks amongst ourselves as it is through our droplets from the respiratory tract that the virus spreads. With the increasing demand for man-force and people requiring to go to their workplaces post lockdown, it is very necessary that we save each other from the virus. In this project, we will go through a detailed explanation of how we can use Python, AI and Deep Learning to monitor social distancing at public places and workplaces are keeping a safe distance from each other by analyzing real-time video streams from the camera and also detect facial mask monitoring using OpenCV and Python. To ensure if people are following social distancing protocols in public places and workplaces, we wanted to develop a tool that can monitor if people are keeping a safe distance from one another, wearing masks or not by processing real-time video footage from the camera. People at workplaces, factories, shops can integrate this tool into their security camera systems and can monitor whether people are keeping a safe distance from each other or not along with that we detect facial mask monitoring using Python with help of haar-cascade algorithm to see whether a person is wearing a mask or not. We are also planning to include thermal screening detection to measure the temperature of the subjects, a dashboard which will display a live report of corona cases around the world. We will also include an alert system that will send a notification to the authorities if the social distancing is not followed or if the temperature exceeds the threshold. The authorities can take suitable measures to isolate the subject and thus prevent the spread of Covid-19.

Keywords : Social Distancing, Covid-19, Mask detection, Object detection

I. INTRODUCTION

Corona Virus Disease or COVID-19 in short is an infectious disease caused by a newly discovered novel coronavirus. Though the mortality rate itself is low, the rate of spread of the virus is so fast that the whole world has been in a state of pandemic for over a year now. First discovered in Wuhan, China in December of 2019 has now spread worldwide.

Symptoms include fever, breathing difficulties, headache, cough, loss of smell and taste. It mostly

affects older people and infant children since their immunity is weaker compared to The best way to prevent COVID-19 virus suggested by leading scientists and doctors, is by maintaining social distance (staying at least 6 ft apart from one another) and wearing a mask (to prevent the virus from entering our body through air and water droplet medium). Corona virus spreads through bodily discharges like saliva, discharge from nose when a person carrying the virus coughs or sneezes, so it's important to cover our nose and mouths in public and keep our surrounding disinfected at all times since the virus can survive on surface of metals and other objects even after few days of contact. Social distancing and quarantining the patients are some effective measures that are being taken to slow down the spread of the virus till an effective vaccine is prepared and approved by WHO.

Covid-19 disease has spread to about 219 countries (India being the second highest affected country) and territories of the world and has infected over 141 million people and killed over 3 million worldwide, according to data compiled by worldometers.info (and rapidly increasing). To limit the spread of Coronavirus, social distancing and observing hygiene standards like compulsory wearing of masks, use of hand gloves, face shield, and use of sanitizer is very important. Government has made it compulsory to follow social distancing and all the other necessary precautions while in public.

1.1 YOLOv3

YOLOv3 is basically one of the very most recent algorithms for Object detection. What this YOLO algorithm does is it approaches the problem of object detection is an unique yet simple manner. Whilst most other algorithms forward the image many times, the YOLO model only does it once. Why we use OpenCV for YOLO is mainly due to the fact relating to the following reasons: it has easy integration with an OpenCV application; OpenCV CPU version is approximately 9x faster; Python support is available easily.

1.2 TENSORFLOW

Tensor Flow is useful in helping us build an array of neural networks which ultimately help in recognizing images almost in an instant. These neural networks are typically known as Convolutional Neural Networks (CNN). The main two approaches to the TensorFlow image recognition are:

- Classification - training the CNN model so that it recognizes categories of images like cats, dogs, cars, or anything another object.
- Object Detection - The fact that Object Detection detects multiple objects is a feature very useful in our case. Apart from this, it also tends to tag and show the exact location of the image. In this particular article, we mainly focus on the object detection approach in TensorFlow.

1.3 SSD

SSD is created mainly to detect objects in live or real time environments, and live footage from public CCTV cameras. R-CNN, which is faster, uses boundary boxes which proposal networks help create, ultimately to create structures and boundaries so it can classify objects. region of proposal network to create a boundary box. A Major advantage we get by using this particular model is that we achieve highs speed in doing tasks such as processing or even classification even though we cannot say that about its accuracy. SSD accelerates the process by removing the unnecessary need of something like the region proposal network. To make up for the drop in accuracy the SSD improves on a few aspects that include multi-scale features as well as default boxes. Such improvements enable the SSD to compete in matching the RCNN's accuracy while using comparatively lower resolution images, which aids in increasing the speed even higher. SSD uses what we call a VGG16 to extract these feature maps after which it detects the objects by using a Conv4_3 layer.

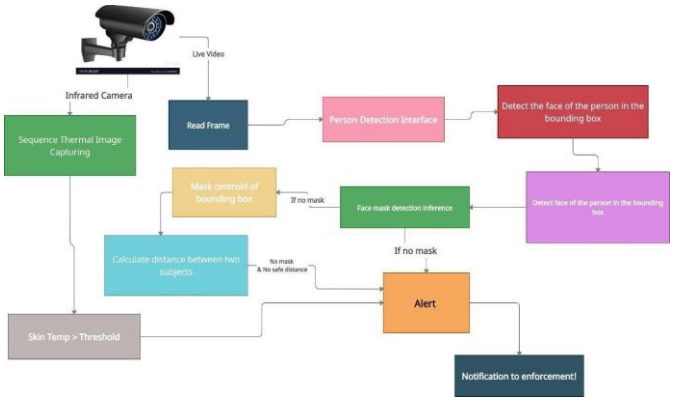

Fig 1: Architectural Diagram

II. LITERATURE SURVEY

In this particular paper Courtemanche and C. Garusolo, J Le (2020) estimated the relationship between social distancing policies as well as the exponential growth rate of the COVID-19 cases which had been confirmed, using an even study regression with multiple policies. Statistical analysis was also conducted using Stata MP, this approach is somewhat different but is very flexible as it has the ability to interact with the present variables with many indicators of time since implementation, therefore trading out the evolution of the policy has an effect over time. Pros: Very Useful for Small gathering area to reduce the overall COVID-19 growth rate to some extent

Andersen M (2020) Over here states that information is being grasp with means of the various social media as well as TV channels which broadcast on a daily basis to the whole world. These channels preserve the tight rules and regulations to every news. The news must be legit and sub divided with correspondence to only the facts and figures which are true. 80 different sources here have been selected, predicted and analyzed in detail with some references to the facts they present u. The really important point here is about one central fact that is being generalized and implemented with being all sorted. Pros: Delivery of the correct information to people throughout different channels as well as analyzing the news about the truth. Fake news is corrected thoroughly and the general public is presented with real information to reduce the ways of spreading the virus.

Simonov.A, Sacher, K Dube , J.P.H and Biswas (2020) in this article show us strong evidence of a Fox New viewership effect shone upon various measures which tell us to stay at home during the early stages of COVID- 19 crisis particularly in the US, up to January 2020 immediately before the outbreak. The popularity in magnitude is comparable to the voting context, and since Fox Viewership is huge, the overall awareness it brings to public on social distancing compliance is quite large, especially because it defines and shows us the expert recommendations which are accurate from leaders of the US as well as the global health com. It is also shown in the latter parts, we fail to find conclusive effects of CNN viewership of social distancing compliance. Pros: The various similarities show that between2016 viewership data and 2020 viewership data may be showing such a long-term effect.

Ging-Xia ma, Hu Shan, Chuan- Mei Zhang, Hong-Liang, Gu-Mei Li, Rui-Mei Yang, Ji- Ming Chen (2020) In this paper follow a very simplistic approach for the ongoing pandemic situation and how to is to handle effectively. The use of face mask is increased in a huge number which may or sometimes also may not fulfill the requirements of peoples need. The different types of approaches are targeted in order to reuse the mask instead of throwing it and effectively and meet the people's needs. Pros: Even though many different measures are taken in counter but the full sterilization can't be guaranteed. The recycling of the masks may cost a lot more so to make the produce efficient and as convenient and irrespective as possible which adhere to quality measures. Not every mask or any mask production can ensure the guarantee or the recycling of products and may not approach to the people's requirements.

Kris O'Dowd, Keerthi M Nair, Parnia Forouzandeh in this article discusses how the increment of a lot of NA masks is not necessary to meet the general public's needs. The mask can only to some extent help prevent from transmission of corona virus but doesn't meet it if full proof. The corona virus has impacted us on a global extent need to be minimized as soon as possible. In order to minimize the virus transmission, usage of mask has to be made compulsory in all countries for the safety of the people in general so many of the lives will be saved. Pros: Even though the discussed context may not ensure the full protection of life, nevertheless it helps to understand the current situation about this pandemic situation. This rally helps us to make significant changes.

Jessica J, Bartoszko Mohammed, Abdul Malik Farooql, Waleed Alhazzan, Mark Loeb have made a comparison of important items to fight covid such as N-95 masks and respirators have been carried out so that prevention of laboratory viral infection and respiratory illness caused by covid can be prevented specially in health care and front-line workers. Pros: Medical masks showed that they also performed similarly to the N95 respirators in preventing laboratory confirmed Influenza infection.

The used model in this article by Mohamed Loey, Gunasekaran Manogaran, Mohamad Hamed N. Taha, Bour Eldeen M. Khalifad (2020) has two main components, out of which the first component is the deep transferring learning (ReaNet50) which works as a feature extractor and the second component is a classical machine which learns like decagon trees. SVM, and ensemble. Pros: People have been found to wear masks to protect their health from air pollution.

Shuo Feng, Chen Shen, Nan Xla, Wiel Song, Mengzhen Fan, Benjamin J Cowfling (2020) in this article emphasize on the fact that WHO currently recommends that people should wear face masks if they have serious respiratory symptoms or if they are taking care for somebody with symptoms in their daily life. If you think you are healthy, you only need to wear a mask. It also applies if you are takin care of a person suspected SAR S- VoV-2 infection.

Wel Lyu, George L. Wehby in this article have made a collection on a statewide face cover with orders from public data sets on various policies and from searching and reviews all the particular state orders issued between April 1 and May 21,2020 of the region. Pros: Since infected people who wear mask reduce transmission risk and because the high proportion of the asymptomatic infected individuals and transmission's, there appears a high case for their effectiveness.

Antonio Olivera- La Ross, Erick G. Chuqulchhambl Gordon P.D. Ingram in this article show the recruited 1078 participants out of which (821 women, mean age = 27.9 years, S0= 10.3) via Internal email = and various means like social networking. Results showed Most participants were from Colombia (87.1%), Peru (6.68%), or Spain-(4.82%); 1.4% were from other Spanish-speaking countries. Pros: This article shows us that being over compliant or reliant on face masks is not good for the sake of our health and safety.

The following paper is named "Social Distance and SAR memory. It discusses about the Impact on the public awareness of 2019 coronavirus (Covid-19) outbreak" written by Welpan Ceolle in 2020, it which it was found that Migration ties to the epi-center, Wuhan had earlier, more durable public awareness of the outbreak. Its performance measure is due to lack of infection stats, and we cannot yet statistically estimate the effect. Advantage in some circumstances could in theory enhanced awareness could have negative impacts.

This following article is called "To mask or not to mask: " Here, Modeling the potential use for the face mask use by the general public has been done to

contain the spread of the Covid-19 pandemic" written by Steffen E., Marina Manousa,2020, in which is discusses that the made models called the baseline mathematical models are prepared to interpret model with no mass usage with mathematical formulation with including all the essential parameters that help to understand the effective understanding of the things which people understand and that usually makes significant changes. It is the primary action of the subject that is able to analyze and interpret with effective implementation.

In "Civic Capital and Social Distancing during the Covid-19 pandemic" written by John Barrious, Efrain, Yael H. in 2020, this article involves about the social distancing factor which may rely on the behavior of the individual how they are being oriented of their own action. This gives us the study about the behavior of the particular individual person with a different perspective.

In the paper titled "Impact of social distancing measures for preventing covid 19 disease 2019" written by Krishna Regmi,Cho Mar Lwin in 2020, the data here are randomized with the effective controlled trials in which the effective checklist with all the random effects of model used for meta-analysis helps to build the power s of relationships. The performance measure of this analysis solely relies on the checklist provided.

In "face masks and human to human transaction" written by John Willey in 2020 the method solely focuses to wear mask in public transport. The advantage is that the welfare of the people and demerit is economic crisis

In "Wearing face masks in the community during the pandemic" written by Institute of Applied Health Research, U.B. in 2020 it states we have to protect others from respiratory droplets. Its performance can be measured by practicing norms like social distancing and handwashing are of prime importance.

In "Mobile phone location data reveal the effect of social distancing on the spread of the Covid-19 epidemic" written by Jinmeng Raol, Yuhao Kangi in 2020, it mentions that the human movement and visit data and the relationship between the mobility changes leads the growth of the infected population. It helps the government to take measure to reduce the spread.

In "Social distancing to slow the US Covid-19 epidemic" written by Mark J., Zahra Raynoidc in 2020, the article measures the interrupted time-series analysis present to estimate the average change in state level Covid- 19 epidemic growth and also to correctly analyze the time-series of the Covid cases whether it has risen or fallen.

In "Political Beliefs affect compliance with Covid-19 Social Distancing Order" written by Palnter M, Qui T in 2020 the article has used geolocation data to document that political beliefs present a significant limitation to the efficiency of state-level social distancing orders in some ways. It also relocates the date from Base Graph, debit card transaction data from Fatuous. It helps in reducing the spread of coronavirus.

Petronio C L Silva, P. C., Batista, P. V., Lima, H. S., Alves, M. A., Guimarães, F. G., & Silva, R. C. in this paper propose the use of a somewhat new technology COVID-ABS, a new SEIR (Susceptible-Exposed-Infected-Recovered) agent-based model which primarily aims to simulate the pandemic using a society of agents that emulate things like, business and government. Seven different scenarios of social distancing interventions have been analyzed in this paper, including various epidemiological and economic effects: such as, do nothing, lockdown, conditional lockdown, vertical isolation, partial

isolation, use of face masks, and use of face masks together with 50% of adhesion to social isolation. Pros: The results showed that policies adopted by some countries, like the US, Sweden and Brazil, are ineffective when the objective is to solely preserve lives. Governments that chose to preserve the economy by not using bad isolation policies, fatally reached a situation with a high cost in human fatality as well as loss to the economy

In this paper, Anass Bouchnita and Aissam Jebrane developed multi-scale model of COVID-19 transmission dynamics has been used for the purpose to quantify the effects of restricting the general population movement and the importance of face masks on disease spread in the nation of Morocco. The objective of this work is not only to provide accurate predictions on the evolution of the epidemic but also to understand and quantify the impact of the adopted strategy on disease propagation. To fulfill this, we implement a social force model that describes the random walk of individuals. We consider two modes of disease transmission. First, through direct person-to-person contact. Second, through contact with contaminated surfaces. An infected individual carrying the virus does not start to develop symptoms until the end of the incubation period is over.

David M. Hartley, Hether Schacht Reisinger, Perencevich. In this paper discuss how to decrease the risk the community is facing. Non-Pharmaceutical discoveries are required to decrease it. The data analysis is illustrating the theoretical and historical result of this is similar to what we are facing now. In order to avoid, policies are required to be there as soon as possible. We cannot be waiting for the last moment, else it will be way too late for us. This paper shows the difference in latency and incubation period in this novel removes the usefulness of the policy. This is the right time for social distancing.

In this paper, Alaa A., Jay K try to characterize the main need and provide the considerations according to the use of these standard face mask option by HCWs in this current pandemic. The respirator has extended the use and reuse cycle to utilize the above US CDC rules and regulations to overcome the viral transmission.

Tadele Assefa Aragaw stated out that microplastics pollution can be a big issue because of the big effect on the aquatic biota and the overall environment. And due to this, the situation is more complicated and the reports are still missing. In addition to this problem, the face mask can be also revealing out, including the management system. It is also noticed that face masks are ingested by upper organisms. Thus, microplastic from mask should be a prime focus. This paper evaluates the face mask is a big potential source for micro plastic contaminations in the water systems.

Ahonen et al. this provides a very efficient image representation based on LBP features. The face image can be divided into several portions in which the LBP distributions are tried to extracted and concatenated in a feature vector which can be used as face descriptor. This can solve different challenges of the performance in the proposed method. Other extensions are also provided in this paper.

Khadharaoui et al. this provides an approx. data of a 3D face model taking care of all the robustness necessary to alter the facial expressions and optimization required to calculate the time. It also provides solutions regarding the extraction of 3D model and position around a small no of pairs of landmarks of the matching. In this paper all the solutions provided are safer and self-descriptive.

Sujata G Bhele Face identification is really fast growing and challenging and at the same time the most interesting area in real time applications. There is a large number of algorithms which have been

developed in face recognition. This list includes PCA, LDA, etc and alot more ANN tools which hybrid combination in this technique. It probes all the methods and parameters that challenges face recognition like pose variation, facial expressions.

Clinton Facial gender classification is an important area in the Face Recognition VT. While it is peripheral to automated face recognition, it has become a widely anticipated topic for research and this are full of potential use in various applications.

Ahmed M Megreya* Face recognition problems during our childhood are well documented. Although mixed results were the output regarding the nature of the problems using different experimental tasks. Using recognition memory paradigm which helps in learning a set of faces and it also provide faces mixed with an equivalent set of distracters. It is also used to trace faces followed by a old/new recognition test.

Wang and Yang This provides the effective way to achieve a much faster and accurate eye states detection in gray level images with constrained backgrounds. The parts of the eye is used to robust in order to find eye pair applicants. Eyes are located for eye verification using SVMs. The eye information is used to detect whether eyes are open or closed after the delocating eyes.

Williams et al. this provides the use of statistics learning algorithms for object localization. It has been observed that the object recognizers using kernel-SVMs for localization by all the means of spatial perturbation of the SVM. While the SVM is applicable to all the frames of the video not depending on the other frames the benefits of the fusion of data are also known. This is solved here by the use of RVM to generate observations which can be fused.

Phillips et al. This provides the two of the most important requirements in support of producing confidential face recognition system. The FRT program has been introduced to address both the issues via the FERET database of facial images. The main objective of this test was to observe the state of art. In addition to that, the aim was to predict the future areas of the research and calculate the algorithm performance.

Bratley et al. This provides 2 ways to apply the Niedereiter's sequences on a PC and discuss the results came out in multiple practical tests on specific integrals. Low sequences are being used for numerical calculation, in simulation and in all other related applications. Methods used for producing the sequences are proposed among Halton, Sobol and Niedereiter. These sequences have the best theoretical properties.

Yang et al. This provides the images which contains faces are very important vision based human interaction and efforts in face processing work for face recognition, face tracking, and expression recognition. But many faces in the image have been localized. In order to build a fully automatic system we require good and efficient face detection algorithms. When we know the single image, which also contain a face regardless of its 3D position. These are challenging problems which are nonrigid and also have a high degree of variation in color, shape, etc.

Lu et al. This provides a face recognition program which utilizes the 3D shape information to build a system which is more robust. For doing this, a 3D face model is constructed by combining several 2.5D face scans. Two non-identical modalities presented by the facial scan are utilized and combined for face matching. This recognition engine includes 2 components which are surface matching and appearance-based matching.

Besl and McKay This provide a general-purpose method to get the accurate and efficient computational registration of 3D shapes combining all the free form curves. This method handles the full 6 degrees of freedom and it is based on repetitive closest algorithm. This algorithm always meets to a point monotonically onto the local minimum. This experiment shows that the rate of convergence is fast during the few reparations. The results show the progress of the used algorithm is on point, sets and surfaces.

Kirby and Sirovich This provides the exploitation of natural symmetries in a proper family of patterns which is discussed inside the framework of Karhunen expansion. This illustrates the extension of the given data and imposes symmetry on the Eigen functions without surpassing the complexity of the computation. This approximation of the faces projecting from outside the dataset is also improved on the average basis.

Fatima Akkhmedova This paper provides on the most important decision points of a face recognition which is the selection of face representation. Efficient characteristics are expected to pass adequate facial information. In this paper, they proposed the set of Hahn Moments as a fresh approach for the features explanation. These moments are mostly used in image analysis because of its invariance, and the ability to grab features locally or globally.

Xiangyu Zhu This provides the information that pose normalization is very important to get the canonical view of face in the conditions. The ideal case scenario is needed to independent of the database and should be automatic. But mostly these methods fail to meet the criteria of the required goals.

Adam Nowosielski In this modern age face recognition has been developed and represented by set of patterns which is derived from brightness of 2D image. In order to maintain proper representation of face under variance of lighting, expression, etc they have provided many templates. This can be achieved by expanding the original structure with some other blocks without including intricate characteristics methods. In this way the efficiency of the system can be achieved.

III. PROPOSED METHODOLOGY

3.1 Distance Calculation & Facemask Detection:
For the calculation of distance the following procedures are followed wherein video is taken in input form and number of unsafe individuals and their position in frame is given as output.

Step 1: From a camera or video feed input is taken.
Step 2: Human frame upon which the calculation is done is received. Step 3: For calculation of bird's eye view:
A/ Our region of interest from the frame that is needed to focus on is received.
B/ We get the bird's eye view of our Region on interest using get perspective Transform.
C/ Following which we calculate the horizontal and vertical unit from points which was marked from the first frame.
Step 4: The frame of the people is detected and center points are fetched from the frame.
Step 5: From step 4 and step 3.c input is fetched according to the application and the detected points in the bird eye's view is projected.
Step 6: Between the horizontal and the vertical unit length, the distance is detected and social distancing between two frames is calculated.
A/Displaying of bird's eye view along with points being colored as red, yellow and green to indicate high, low and no risk respectively.
Step 7: The line is displayed between people closer to them with different color as the bird eye's frame in the bounding boxes for the normal frame.

Thus we developed distance calculation and face mask detection tool with the aim of knowing if people are keeping a safe distance between one another with results from real time live video streams from camera.

Features of the module are as:

- To detect human in the frame with yolov3
- To measure distance between every individual human entity who is detected in the frame
- To show the number of people being at risk.

3.2 Dashboard:

As this virus is new to everyone, we are creating a dynamic website to create awareness among people thus preventing the spread. We did this by building a very basic webpage with the help of HTML and the styling is done with in CSS. We are also plugging in ready-made APIs. We are using JavaScript libraries like gridster.js, dazzle, etc. to include lots of charts and diagrams to make it look attractive and informative.

We have made our homepage in which total cases, deaths and recovery numbers are displayed. We are working on putting country wise chart and various graphs like on April 4th the cases reached to over 1 lakh in a day so, we are planning to create pop-up notification to notify people. In order to make it more informative, we can also publish the news related to the pandemic by various international organizations like WHO.

3.3 Thermal Screening:

Fever is one of the earliest signs of covid-19 and temperature screening can be a focal point in detecting new cases. The threshold that we will be setting in current scenario is 100.4°F (38.0°C) or higher. The thermal camera will generate the video/photo and if the temperature detected here is higher, it will be notified to the authorities through an alert on their smart device.

3.4 Alert System:

Social Distancing Alert System uses existing cameras in combination with Computer Vision to detect if people are following the basic protocols of social distancing or not. This module uses existing IR cameras to identify if people are following social distancing. Social Distancing system finds the distance between two people detected in the camera frame. The platform generates notifications and sends it via SMS or notification warning if anyone is found violating laws.

For implementing our alert system, we need to implement our face detection system inside a closed environment like an office. This is so because our alert system primary works on the basis of having the personal data of the suspects, and an office environment ensures that a particular organization has records of every member present at the location with their identification details as well as phone number. If cameras detect that two or more people are in close interaction with each other an alert will be sent to the particular members mobile phone via an SMS.

This is only possible if the data of the staff are already present in a SQL database which links up with the given signal and proceeds to send the alert to the violator. When our monitoring software finds two or more people in close proximity to each other, the person is identified as he/she is stored in the database with contact information, and an alert is sent immediately. For this, the organization's database is queried upon the username of the identified person and his/ her mobile number is fetched from the database and thus notification through message is delivered to him/her warning for the violation and asking him to maintain social distancing. In a large scale, we can use message services companies to make alert and notifications to the identified person. It may

not be suitable for open public place where person's identification isn't a must.

IV. Result and Discussion

4.1 Social Distance Estimator:

The social distance estimator after capturing the live videos tries to estimate the distance between people. Any distance estimated to be above the threshold distance value is once analyzed is signaled with the red line surrounding it while the safe distance remains within the green lines as shown in Fig 2. Thus, with the social distance estimator, alerts can be created if any person is violating the rules and not maintaining social distance. while the alert system implementation remains quite trivial, efforts for creating a reliable alert system so as to notify the person in case of violation of social distance is being made by our team.

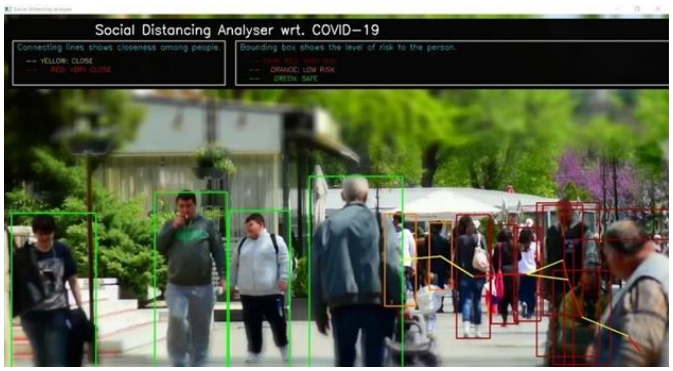

Fig 2 : Distance Estimator

4.2 Dashboard:

The dashboard has been designed in a concise and simple manner so that anyone visiting can easily understand the basic functionalities and get the required information at a glance. Both the public and private offices and organizations can easily use social distancing estimator with basic login and entering their live-streamed video can detect the person and analyze the distance between them. We can choose and upload a video file as shown in Fig 3 and the system will see the distance estimator working.

Fig 3 : Homepage/Dashboard

We have also added two windows where we can browse the website Worldometer to view the live world statistics of spread of coronavirus throughout the world. This has been done by using iframe tag in HTML.

4.3 Face Mask Detection:

Anyone with or without a mask can be examined through the live video and a person without a mask is enclosed with a red color line while a person with the mask is enclosed with a green color line. The face mask detection is another great module along with the social distance estimator so as to recognize if a person is following all the protocols and not violating any norms as demonstrated in Fig 4.

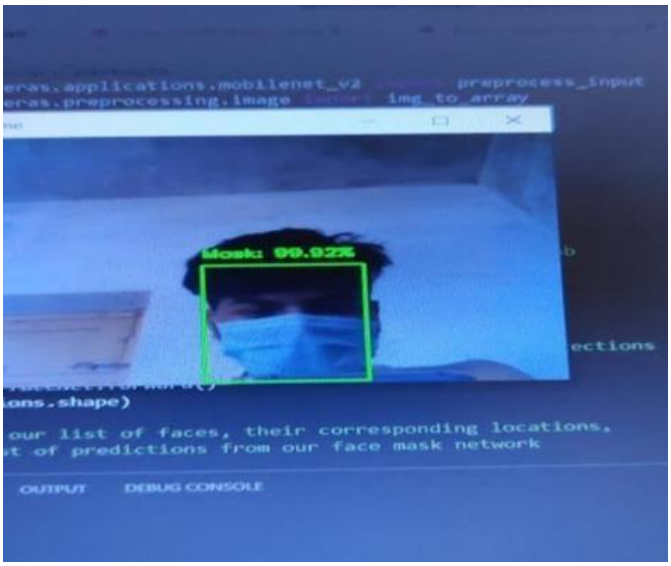

Fig 4 : Face mask detection

V. Conclusion

In conclusion, in such brutal times of the covid virus which is affecting our day to day lives, we have used python, computer vision and deep learning to implement a social distance monitoring system which enables us to make sure, be it in an office environment or public, that multiple people are not coming in close contact with each other, to avoid the spread of the Covid-19 virus. We also included a live covid dashboard, which can help us get live information about cases through the country and the world. We mainly use OpenCV and python with the help of an algorithm called haar-cascade. This helps us detect whether a person is wearing a mask or not. We can take input in any form of photos or live videos in almost any environment. In a few simple words, we can keep any camera in public places or any other environment, then our social distancing monitoring tool can tell us if people are keeping distance as well as wearing masks or not.

Social Distance Estimator is found to work great with many random videos downloaded directly from google. While efforts are being made to capture live videos and run into the machine to further prove its effectiveness, severe lockdown in the state has made it challenging. The dashboard has been made the simplest possible so anyone can easily retrieve the information and navigate oneself to any section as per the use. The social distance estimator is functional in alerting anyone violating the social distance protocols with red lines on the screen while efforts by our team are being made to make possibilities to alert the person in an individual through texts or calls. Another great functionality is mask detection which helps in analyzing if a person in the crowd has worn a mask or not and in case, he/she has not worn, he/she gets highlighted on the display screen with red lines enclosed around him.

Therefore we have successfully implemented all these functionalities and developed this Social Distance Estimator.

VI. REFERENCES

[1]. Courtemanche, C., Garuccio, J., Le, A., Pinkston, J., & Yelowitz, A. (2020). Strong Social Distancing Measures In The United States Reduced The COVID-19 Growth Rate: Study evaluates the impact of social distancing measures on the growth rate of confirmed COVID-19 cases across the United States. Health Affairs, 10-1377.'

[2]. Andersen, M. (2020). Early evidence on social distancing in response to COVID-19 in the United States. Available at SSRN 3569368.

[3]. Simonov, A., Sacher, S. K., Dubé, J. P. H., & Biswas, S. (2020). The persuasive effect of fox news: non- compliance with social distancing during the covid-19 pandemic (No. w27237). National Bureau of Economic Research.

[4]. Ma, Q. X., Shan, H., Zhang, C. M., Zhang, H. L., Li, G. M., Yang, R. M., & Chen, J. M. (2020). Decontamination of face masks with steam for mask reuse in fighting the pandemic COVID-19: experimental supports. Journal of Medical Virology.

[5]. O'Dowd, K., Nair, K. M., Forouzandeh, P., Mathew, S., Grant, J., Moran, R., ... & Pillai, S. C. (2020). Face Masks and Respirators in the Fight against the COVID-19 Pandemic: A Review of Current Materials, Advances and Future Perspectives. Materials, 13(15), 3363.

[6]. Bartoszko, J. J., Farooqi, M. A. M., Alhazzani, W., & Loeb, M. (2020). Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and metaanalysis of randomized trials. Influenza and other respiratory viruses.

[7]. Loey, M., Manogaran, G., Taha, M. H. N., & Khalifa, N. E. M. (2020). A hybrid deep transfer learning model with machine learning methods for face mask detection in the era of the COVID19 pandemic. Measurement, 108288.

[8]. Feng, S., Shen, C., Xia, N., Song, W., Fan, M., & Cowling, B. J. (2020). Rational use of face masks in the COVID-19 pandemic. The Lancet Respiratory Medicine, 8(5), 434-436.

[9]. Lyu, W., & Wehby, G. L. (2020). Community Use Of Face Masks And COVID-19: Evidence From A Natural Experiment Of State Mandates In The US: Study examines impact on COVID-19 growth rates associated with state government mandates requiring face mask use in public. Health Affairs, 39(8), 1419-1425.

[10]. Olivera-La Rosa, A., Chuquichambi, E. G., & Ingram, G. P. (2020). Keep your (social) distance: Pathogen concerns and social perception in the time of COVID-19. Personality and Individual Differences, 166, 110200.

[11]. Chen, H., Xu, W., Paris, C., Reeson, A., & Li, X. (2020). Social distance and SARS memory: impact on the public awareness of 2019 novel coronavirus (COVID-19) outbreak. medRxiv.

[12]. Eikenberry, S. E., Mancuso, M., Iboi, E., Phan, T., Eikenberry, K., Kuang, Y., ... & Gumel, A. B. (2020). To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID- 19 pandemic. Infectious Disease Modelling.

[13]. Barrios, J. M., Benmelech, E., Hochberg, Y. V., Sapienza, P., & Zingales, L. (2020). Civic capital and social distancing during the covid-19 pandemic (No. w27320). National Bureau of Economic Research.

[14]. World Health Organization. (2020). Advice on the use of masks for children in the community in the context of COVID-19: annex to the Advice on the use of masks in the context of COVID-19, 21 August 2020 (No. WHO/2019-nCoV/IPC_Masks/Children/2020.1). World Health Organization.

[15]. Liu, X., & Zhang, S. (2020). COVID-19: Face masks and human-to-human transmission. Influenza and Other Respiratory Viruses.

[16]. Cheng, K. K., Lam, T. H., & Leung, C. C. (2020). Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity. The Lancet.

[17]. Gao, S., Rao, J., Kang, Y., Liang, Y., Kruse, J., Doepfer, D., ... & Yandell, B. S. (2020). Mobile phone location data reveal the effect and geographic variation of social distancing on the spread of the COVID-19 epidemic. arXiv preprint arXiv:2004.11430.

[18]. Siedner, M. J., Harling, G., Reynolds, Z., Gilbert, R. F., Venkataramani, A., & Tsai, A. C. (2020). Social distancing to slow the US COVID-19 epidemic: an interrupted time-series analysis. MedRxiv.

[19]. Painter, M., & Qiu, T. (2020). Political beliefs affect compliance with covid-19 social distancing orders. Available at SSRN 3569098.

[20]. Milne, G. J., & Xie, S. (2020). The effectiveness of social distancing in mitigating COVID-19 spread: a modelling analysis. medRxiv.

[21]. Punn, N. S., Sonbhadra, S. K., & Agarwal, S. (2020). Monitoring COVID-19 social distancing with person detection and tracking via fine-tuned YOLO v3 and Deepsort techniques. arXiv preprint arXiv:2005.01385.

[22]. Singh, R., & Adhikari, R. (2020). Age-structured impact of social distancing on the COVID-19 epidemic in India. arXiv preprint arXiv:2003.12055.

[23]. Briscese, G., Lacetera, N., Macis, M., & Tonin, M. (2020). Compliance with covid-19 socialdistancing measures in italy: the role of expectations and duration (No. w26916). National Bureau of Economic Research.

[24]. Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., ... & Hajizadeh, A. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. The Lancet.

[25]. Silva, P. C., Batista, P. V., Lima, H. S., Alves, M. A., Guimarães, F. G., & Silva, R. C. (2020). COVID- ABS: An agent-based model of COVID-19 epidemic to simulate health and economic effects of social distancing interventions. Chaos, Solitons & Fractals, 110088.

[26]. Bouchnita, A., & Jebrane, A. (2020). A multi-scale model quantifies the impact of limited movement of the population and mandatory wearing of face masks in containing the covid-19 epidemic in

morocco. Mathematical Modelling of Natural Phenomena, 15, 31.

[27]. Hartley, D. M., Reisinger, H. S., & Perencevich, E. N. (2020). When infection prevention enters the temple: Intergenerational social distancing and COVID-19. Infection Control & Hospital Epidemiology, 1-2.

[28]. Aragaw, T. A. (2020). Surgical face masks as a potential source for microplastic pollution in the COVID-19 scenario. Marine Pollution Bulletin, 111517.

[29]. Adolph, C., Amano, K., Bang-Jensen, B., Fullman, N., & Wilkerson, J. (2020). Pandemic politics: Timing state-level social distancing responses to COVID-19. medRxiv.

[30]. Adolph, C., Amano, K., Bang-Jensen, B., Fullman, N., & Wilkerson, J. (2020). Pandemic politics: Timing state-level social distancing responses to COVID-19. medRxiv.

[31]. Ganem, F., Mendes, F. M., Oliveira, S. B., Porto, V. B. G., Araujo, W., Nakaya, H., ... & Croda, J. (2020). The impact of early social distancing at COVID-19 Outbreak in the largest Metropolitan Area of Brazil. MedRxiv.

[32]. Thunstrom, L., Newbold, S. C., Finnoff, D., Ashworth, M., & Shogren, J. F. (2020). The benefits and costs of using social distancing to flatten the curve for COVID-19. Journal of Benefit-Cost Analysis, 1-27.

[33]. Zhang, Y., Jiang, B., Yuan, J., & Tao, Y. (2020). The impact of social distancing and epicenter lockdown on the COVID-19 epidemic in mainland China: A data-driven SEIQR model study. medRxiv.

[34]. Nguyen, D. T., Li, W., & Ogunbona, P. O. (2016). Human detection from images and videos: A survey.

[35]. Pattern Recognition, 51, 148-175.

[36]. Ivasic-Kos, M., Kristo, M., & Pobar, M. (2019, April). Human detection in thermal imaging using YOLO. In Proceedings of the 2019 5th International Conference on Computer and Technology Applications (pp. 20-24).

[37]. Sharma, K. U., & Thakur, N. V. (2017). A review and an approach for object detection in images.

[38]. International Journal of Computational Vision and Robotics, 7(1-2), 196-237.

[39]. Tiwari, M., & Singhai, R. (2017). A review of detection and tracking of object from image and video sequences. Int. J. Comput. Intell. Res, 13(5), 745-765.

[40]. Zhao, Z. Q., Zheng, P., Xu, S. T., & Wu, X. (2019). Object detection with deep learning: A review.

[41]. IEEE transactions on neural networks and learning systems, 30(11), 3212-3232.

[42]. Jin, H., & Sakauchi, M. (2001, October). Content-based objects detection for the recognition of building images. In Proceedings 2001 International Conference on Image Processing (Cat. No. 01CH37205) (Vol. 2, pp. 705-708). IEEE.

[43]. Stojmenovic, M. (2007). Algorithms for real-time object detection in images. Handbook of Applied Algorithms: Solving Scientific, Engineering and Practical Problems, 317-346.

Cite this article as :

Sh

Raj Kushwaha, Kismat Khatri, Yogesh Mahato , "Social Distancing for Covid-19 Monitoring System", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 7 Issue 5, pp. 49-61, September-October 2021. Available at doi : https://doi.org/10.32628/CSEIT217521

Journal URL : https://ijsrcseit.com/CSEIT217521