"An Automated Social Distance Monitoring & Alarm System based on Human Structure Using Video Surveillance in COVID-19 Pandemic by AI Techniques, A Review".

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Abstract

In the fight against the corona virus (COVID-19), to ease the spread of the disease social distancing is very effective measure. In this pandemic situation people staying at home will flatten the curve. To meet the basic needs of the people, many Customers from manufacturing and pharmaceutical Industrial are going to work every day. In this project, an AI-enabled Social Distance detecting tool that can detect it people are keeping a safe distance from each other by analyzing a real time video streams from the camera and also from recorded videos.

Keywords

Covid-19,video surveillance ,social distancing,openCV,python,Computer vision.

1. INTRODUCTION

Corona virus disease 2019(Covid-19) has been announced by WHO (World Health Organization). People knew the value of keeping social distance from the infected person from many generations. To stop the spreading of virus, we need global coordinated effort. An action has been taken to minimize contact with other individuals. In February It has been made mandatory for all the individuals to keep a social distance of approximately 2 meters away from each other. Corona virus got their name from looking into under microscope. The virusconsists of a core genetic surrounded by a envelope with protein spikes.

Social distancing is only one solution for non-pharmaceutical infection control actions that can stop spreading at corona virus disease.

The WHO passes that Covid-19 is spread through droplets and families during close connection between infector and infective therefore, social distance can stop the transmission of infection from other peoples.

Covid-19 belongs to the family of corona virus caused diseases, initially it was found in Wuhan, China in Dec 2020.In the Month of March 2020,it has been spreaded over 114 countries with 118,000 positive cases and 4000 deaths. To avoid it, there was only one solution i.e social distancing .Social distance is preffered as best stopper in present situation. All the medical experts has already found a vaccine in India by name covidshield &covaxin ,where all are instructed to take the vaccination from govt of india.A recent study indicates that social distancing the important measure and essential to prevent covid and it the best way to reduce the infection &physical contact between the groups of people.hence,precautionarysteps.

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2. RELATED WORK

[1] “Monitoring COVID-19 social distancing with person detection and tracking via fine-tuned YOLOV3 and Deep sort techniques”, NARINDER SINGH PUNN, ANAND KUMAR SONBHADRA and SONALI AGARWAL.

The article proposes about the frame work of deep learning and to automate & detect monitor the social distancing using real time video. The Proposed framework mainly focuses on the YOLO v3 Model & to separate the humans in the video by using bounding boxes & and assigned Ids.The results of YOLO v3 Model is further compared with other models like CNN(convolution neural network),SDD(single short detector)etc.Based on the 3D feature, the vectorized L2 norm is calculated by using centroid coordinates and dimensions of the bounding box.the results of YOLO V3 models are futher compared with other popular state of art models,e.gCNN,SSD etc.here, values are calculated by classification and localization. it mainly includes mainly support and mitigate the corona virus pandemic along with minimum loss of economic endeavors and purpose a solution to detect the people at any public place. the generated bounding boxes aid in identifying the peoples satisfying the closeness property. The number of violation are confirmed by computing the number of groups formed and violation index term computed as the ratio of the number of number of people to the number of groups.since this approach can be fine tuned to better adjust with corresponding fields of view.the main proposes is an efficient real image based framework to automate the process of monitoring the social distancing via object dectection and tracking approaches.

[2] “Deep Social: Social Distance monitoring and infection risk assessment in COVID-19 pandemic”, MARDI REZAEI and MOHSEN AZARMI.

The article proposes YOLOv4 based Deep Neural Network (DNN) model and it includes the mapping of approximate people detecting and social distance monitoring in challenging condition. It also provides online risk assessment scheme by using spatial temporal data from moving objects. This proposed model identifies high risk zones with huge virus spread and infections. By using the large and comprehensive dataset the proposed method was evaluated. The outcome of this proposed model is applicable to everyone irrespective of their sectors.

[3] “COVID-SAFE: An IOT based system for automated health monitoring and surveillance in post pandemic life”, SEYED AHAHIM VEDAE, MOHAMMED REZA MOHEBBIAN, HAMID ROZA and MARIAN MANSOREAN.

The article proposes about the framework, which is made of three parts: IOT node, mobile app, ML techniques.Iot node detect health parameters, mobile app is used for displaying health report & also tells peoples to keep the social distance. In this paper a Radio Frequency (RF) distance-monitoring method is applied to notify users to keep social distance. This system reduces the risk of exposure to corona virus.

3. EXISTING SYSTEM

The existing system focuses on identification of people on image or video stream whether the social distance is maintained or not with the help of computer vision and deep learning libraries

Approach

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1) Human structure identification

2) Human key extraction

3) Crowd detection for social distance measurement

4) Predict high risk zone of social distance violation

5) Raise alarm signal for high-risk people zones

Flow Chart

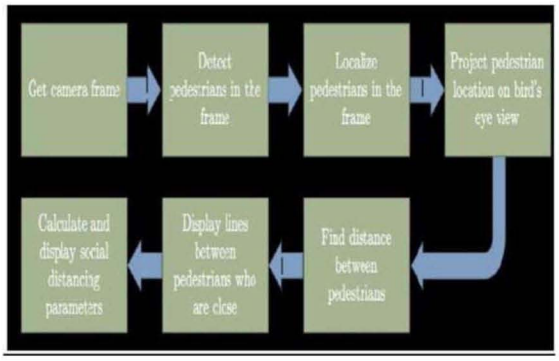

Fig1: Flow diagram of social distancing detector model.

As we take real time video as input, we need to collect frames from the camera, for that purposes we need to convert normal view to bird's-eye view. In the next step, we need to select four points from the video which is called as ROI (region of interest) from the place where we are interested to monitor social distance. To locate them to corners of rectangle in bird's eye view, where those points should be parallel to the real world when we see it from bird's eye view.

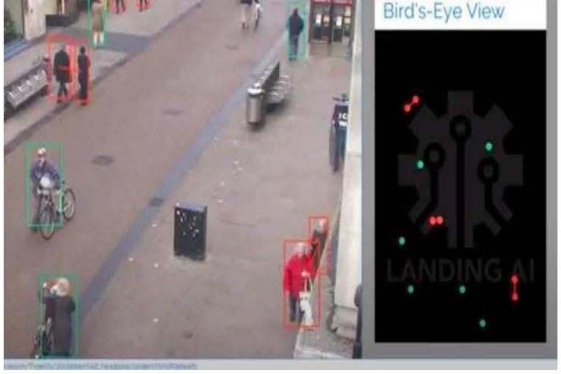

Fig2: Social distance monitoring using bird's eye view.

We assume, all the human beings stood on the same ground plane. The top view has a feature of spreading of points uniformly horizontally and vertically. We can understand from this mapping, we can determine the transformation which has been applied to entire image.

From the Figure2, we can analyze that how to choose ROI (region of interest). By using mouse click event we need to draw eight Points in the first frame. In those eight Points, first four points determine ROI so that we can monitor social distancing in both horizontal and vertical direction and those should be parallel with ROI from above image. We canidentify that point (1,2) defines 180cm in horizontal directions and point(1,3) defines 180cm in vertical directions. As we can see ROI formed by first 4 points with different length in both directions, after transformation we get number of pixels in 180 cm for horizontal and vertical directions. Now we can calculate scale factor from point 5, 6, 7 in both directions at the bird's eye view.

Detection

In the next step, we need to detect pedestrians in the frame and localize them in the frame by drawing boundary box. By applying minimal post-processing, we can clear the output bounding boxes. so that we can reduce the risk of over fitting.

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3. Distance Calculation

In the further step, we need find location of pedestrians on bird's eye view and also need to find distance between pedestrians. For finding the pedestrians locations, we need to take bottom center-point of the bounding box as person location in the frame. by applying transformation to the bottom centre of each individuals, we can estimate(x,y) location, In the last step, we need to determine distance between pedestrians by applying scaling factor in both directions.

4. Methodology

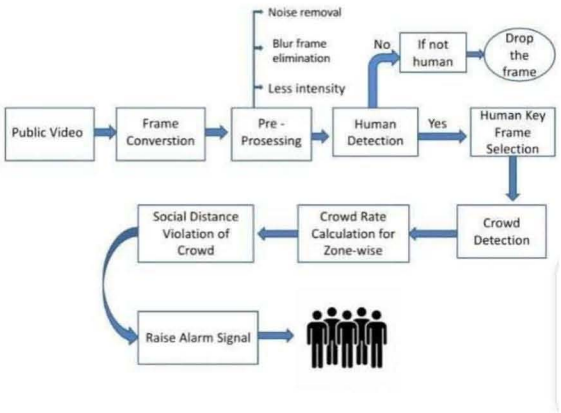

Fig3: architecture of social distancing and alarm system.

In first step, we will take the real time public video, later we will convert them into frames. In the pre-processing stage, we are going to remove the noise from background, removal of blur frame elimination and removal of less intensity. Further, we will detect the human. if the human is not available we are going to drop the frame. In the next step, Human key frame selection will take place. After this process, Crowd detection for social distance measurement will be done. Depending on the measurements the crowd rate calculation for zone-wise. later, we will detect the people violating the social distance in the crowd for them the alarm signal will be raised.

Device detection

In this project, we are going to check body temperature and percentage of blood oxygen. First, we use Lm 35 sensor to measure the body temperature. if it crosses the threshold value, then the person in the frame is treated as positive then device will display as "s1+"otherwise person is normal.Next,for detecting heartbeat an oxygen. We are going to use Max30100.if the person having high oxygen percentage, then he is having the symptom of covid-19 and it will display as "s2+".

Fig4: Body temperature detection

Fig5: percentage of oxygen detection

5. CONCLUSION

The emerging trends and the availability of intelligent technologies make us to develop new models that help to satisfy the needs of emerging world. So developed a novel social distancing detector which can possibly contribute to public healthcare. The paper gives a framework based on deep learning technology using which, we can automatically monitor the social distancing. Here each people are detected and tracked using boundingboxes.

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The clusters of people are identified based on closeness, which is calculated using Bird's eye view approach. The violations are computed based on calculating numbers of teams found and violation index term is calculated as ratio of amount of people to the amount of groups. The system works very effectively and efficiently in identifying the social distancing between the people and generating the alert that can be handled and monitored.

6. ACKNOWLEDGMENT

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