

DEEP LEARNING BASED SOCIAL DISTANCE MONITORING AND FACE MASK DETECTION FOR COVID-19 SAFETY GUIDELINES.

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Abstract - According to data obtained by the World Health Organization (WHO), 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 that contributes to public safety, we proposed an efficient computer vision-based approach focused on the real-time automated monitoring of people to detect both safe social violations through cameras. In this proposed system modern deep learning algorithms have been mixed with geometric techniques for building a robust model which covers three aspects of detection, tracking and validation. Thus, the proposed system favors the society by saving time and helps in lowering the spread of corona virus. It can be implemented effectively in current situation when lockdown is eased to inspect persons in public gatherings, shopping malls, etc. Automated inspection reduces manpower to inspect the public and also can be used in any place.

Key Words: Social distancing, Computer Vision, CNN's, OpenCV, COVID-19, AI, machine learning, deep learning, Face mask detection.

1. INTRODUCTION

Since COVID-19 has become a pandemic, the entire world is finding ideas and methods to stop the spread of it. As the ground rule to stop the spread is to maintain social distance and wearing a mask while going out. The novel COVID or COVID-19 began spreading during 2019 December at first from China, the city of Wuhan. In China, the infection started from the creatures and spread generally as a pandemic circumstance everywhere on the world. Corona Virus infection communicates to others however coordinates actual contact with the influenced patients and through air. The infection straightforwardly hit the lung cells through respiratory arrangement of the patients and permits it to recreate the infection and makes an extreme irresistible problem in an exceptionally limited ability to focus. Our main motive, Face mask detection with Social Distancing is the task of identifying an already detected object as that person wear mask or not and they are walking with maintaining Social Distance to each other.

1.1 SYMPTOMS OF COVID-19

The most widely recognized manifestations of COVID are dry cough, fever, windedness, discomfort and migraine. The quick spread of COVID produces serious muscular torments and empowers the individuals with debilitate invulnerable framework got trained by it without any problem. The outrageous phase of COVID-19 prompts demise of numerous people groups with extreme failing of lung and different organs of the body. Different examples of medicines are dealing with by the doctors everywhere on the world to find an effective method of restricting the infection being communicated to most exceedingly terrible stage.

1.2 FACE MASK DETECTION

Face Mask Detection Platform utilizes Artificial Network to perceive if a person does/doesn't wear a mask. The application can be associated with any current or new IP cameras to identify individuals with/without a mask. The face mask detection process starts from the image acquisition using a camera. The imaging device and the modules are developed using TensorFlow and Open-CV programming detect the face and evaluate all faces point that to detect is that face wear mask or not. If person wear mask they will be in safe zone it display as green rectangle-box with safe alert where if person don't wear mask then it will be shown in red rectangle-box and with the message of Alert as well.

1.3 SOCIAL DISTANCING DETECTION

Social Distancing detection will detect that two or more persons in a single frame are walking with maintain social distancing with at least 0.80 meter of range with each other. By using Euclidean Distance method, it will detect that persons maintaining or following social distancing under guidance of WHO. If they maintain then it will shown in Green Rectangular-box with safe alert message where if they don't following social distancing then system will display an alert message with red rectangular-box.

1.4 REQUIREMENT ANALYSIS

Hardware Requirements

- GPU : Graphics Processor(NVDIA) min 2GB
- CAMERA : Web cam/ CCTV/ Mobile cam
- Ram – 8GB
- Camera

Software requirements

- SOFTWARE : Anaconda , Python 3.x
- EDITOR : VS Code/Pycharm/Sublime/Spyder
- ENVIRONMENT : TensorFlow
- GPU Drivers : NVIDIA CUDA 11.0 requires 450.x or above

1.5 GPU (Graphics Processing Unit)

WHY GPU...??

CUDA is developed by Nvidia. CUDA is a computing platform used for general computing on its own processing units. CUDA allows developers to gear up compute intensive apps by consuming the power of graphical processing units from AMD. The pair of CUDA and Nvidia GPUs is very important in certain application area, like deep learning .

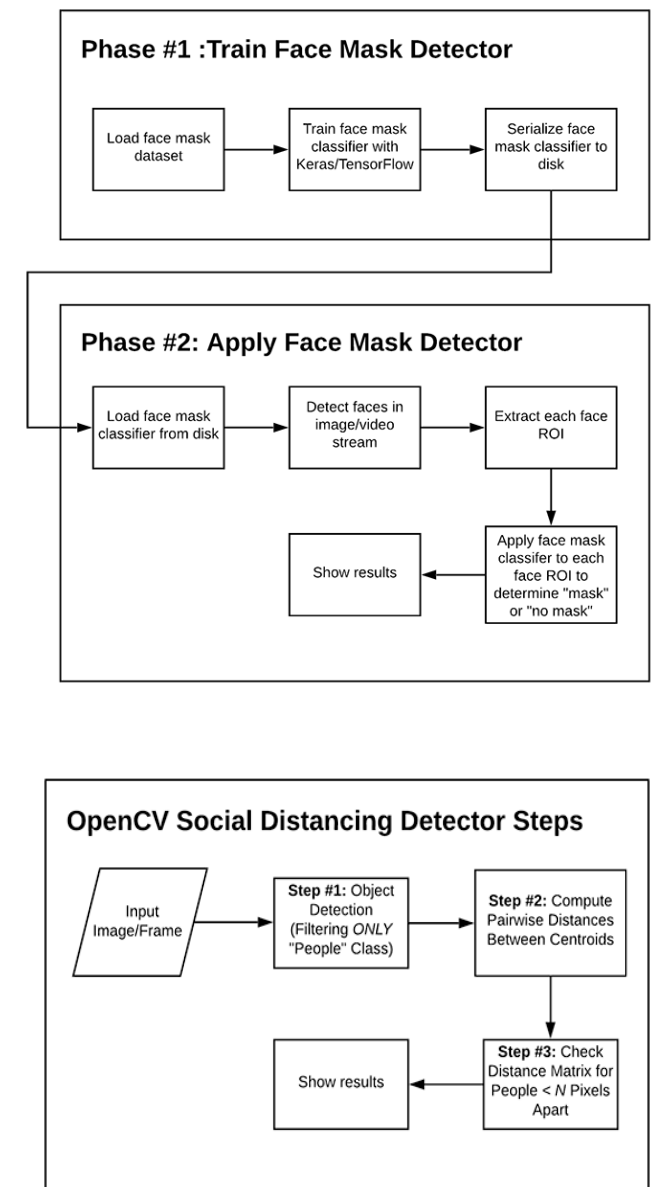
• Tensor flow allows all GPUs?

Current version of Tensor flow allows only GPU , CUDA, NVIDIA toolkits. Therefore we need to follow all the steps to install them correctly bro boost tensor flow model. CUDA has widened it's scope for past few years. As of now CUDA version is 9.2, with multiple P100 server GPU, we can use upto 50x improvement over CPU . The previous GPU server's [K80] offered 5x till 12x performance computation over CPUs.

1.6 ADDITIONAL METHODS AND TECHNIQUES

- Pretrained YOLOV3 dataset to detect the human beings
- SSD dataset to detect faces
- Mobilenetv2 for facemask detection
- Euclidean algorithm used for calculating social distance violations.

2. METHODOLOGY



2.1 OBJECTIVES

1. With the help of computer vision and deep learning, we can keep track on humans and compute the distance between them in pixels by using computer distance algorithms and set the standard maintained distance to be followed and get an overview of people violating the law and concerned authorities can take the actions accordingly.

2. Deep Neural Network-Based model for automated people detection, tracking, and inter-people distances estimation and detecting whether the people wearing face mask or not in crowd and giving the alert to them if they are not maintaining anything and informing to nearby authorities.

3. Detecting pedestrians and draw a bounding box around each pedestrian

4. Applying object detection to detect all people in a video stream and computing the pairwise distances between all detected people.

5. Based on these distances, check to see if any two people are less than N pixels apart

3. WORKING

Technology holds the key here. We introduce a Deep Learning based system that can detect instances where face masks are not used properly. Our system consists of a dual stage Convolutional Neural Network (CNN) architecture capable of detecting masked and unmasked faces and can be integrated with pre-installed CCTV cameras. This will help track safety violations, promote the use of face masks, and ensure a safe working environment. The study is carried out by analyzing the necessary technologies involved in the previous research and formulating the efficient model that help the people in real-time. Application development using keras and Tensor flow is most widely used in current trends, henceforth we are suggesting the Python based image processing and machine learning technique to achieve the robust structure the feasibility of considering a diversity of cases using the proposed method with a high level of confidence and accuracy in social distancing monitoring and risk assessment with the help of Deep Learning and Computer Vision.

4. CONCLUSIONS

Social distancing and wearing the mask to be a crucial measure to prevent the spread of contagious diseases such as COVID 19. many digital development companies are launching mask detection API services that help the developers to build a face mask detection system instantly to serve the society amid the emergency. we proposed a model that uses MobileNet v2, computer vision, SSD architecture by social distancing monitoring and face mask detection that helps maintain a safe and secure environment and avoids the spread of covid-19 aid police by minimizing their physical surveillance work in restriction zones where surveillance is required by means of camera feeds the technology encourages reliable and real time face detection of public wearing masks. Besides the proposed system is easy to deploy into an existing system while keeping the safety and privacy of users data. The proposed system is an efficient real-time deep learning based framework to automate the process of monitoring the social distancing and face mask detection and tracking approaches, where each individual is identified in the real-time. In this current situation it is the most efficient way when the lockout is eased and helps to track public places in automated manner. This solution has a capability to significantly reduce violations by real-time monitoring, and it would improve public safety through saving time and helping to reduce the spread of covid-19.

This can implemented in places like temples, office, shopping complex, schools, college, metro stations, banks, airports, etc.

5. FUTURE SCOPE

Objects are usually measured by there individual features. facial recognition involves the using computing to identifying humans faces. this can include distance between eyes, and the relative positions of the nose, mouth and chin. This information is combined to create a facial signature and the profile can be created. However when the facial recognition is used to identify faces in the crowd which also helps when the same person detected that he or she is not wearing mask for multiple times action can be taken against them.

1. Breathing rate detection- covid-19 directly impacts the lungs and damages the alveoli therefore difficulty in breathing is one of the symptoms of covid-19. Low oxygen levels in the blood, due to damage to the alveolus. deep machine learning using the convolution neural network there appeared a decision to detect respiration rate, based on signals, received from a variety of body sensors.

2. Temperature screening- there has been a big focus on temperature screening as fever is one of the first symptom of corona virus, temperature screening for covid-19 is also an integral component of containment efforts globally. Although on the surface the screening process appears straightforward.

3. Coughing and Sneezing Detection: symptoms of coronavirus and flu are almost similar. Some common symptoms of COVID-19 include fever, tiredness, dry cough. One can also experience body pain, nasal congestion, running nose, sore throat and diarrhoea using a deep learning techniques detects asymptomatic Covid-19 infections through cellphone-recorded coughs

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