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# FACE CONCEAL AND SOCIOGENIC GAP RECOGNITION WITH AN VOICE ALERT SYSTEM

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**ABSTRACT:**

The recent outbreak and rapid transmission of the COVID 19 pandemic have caused many shutdowns in different industries and areas around the world. In this case, the world health organization recommends the people wear a face mask and practice a socio genie gap between each people at least 6ft or 1m in public places. This paper developed a system that automatically detects the violation of wearing a face mask and socio genie gap among people to assure their safety in public places during the pandemic. Our proposed system operates in two stages first it identifies face masks and then it starts measuring the socio genie gap between people. The proposed system uses three different algorithms which are Fuzzy logic, SVM(Support Vector Machine), and Decision Tree algorithm along with CNN which uses the pixels of the transformed image to compute the actual distance between people. A threshold of six feet was considered to capture physical distance violation from the captured live video of pedestrians. Then we start training the model using TensorFlow and keas for object detection and our system is achieved a mean average precision score of accuracy value of 99%. Finally, our proposed model will detect people in the live video which we are given as input in the system and it will make a voice alert when people violate wearing a face mask and maintain a sociogenic gap in public places.

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***Keywords:*** **COVID19, Face Mask and Social Distance, CNN, Voice Alert,SVM,Public Safety**

## 1. INTRODUCTION

An automatic monitoring system called "Face Conceal And Socio Genic Gap Recognition With An Voice Alert System" was built to monitor the people in public places and this is used to prevent the spreading of the virus. The novel COVID or COVID-19 began spreading during 2019 December at first from China, the city guest Wuhan. In China, the infection is started from the creatures and spread generally as a pandemic circumstance everywhere in the world and it has become a

pandemic, the entire world is finding solutions 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. Coronavirus infection communicates to others however coordinates actual contact with the influenced patients and through the air. The infection spread to the lung cells through a respiratory arrangement of the patients and permits it to recreate the infection and makes an extremely irresistible problem in an exceptionally limited ability to focus time. Due to the high density of peoples roaming in public places, there is a high risk of the infection spread to the people. Therefore, a systematic safety monitoring system in public places is important that ensures maintaining the physical distance and wearing face masks can enhance people's safety.

In some cases, safety officers can be assigned in public places to inspect people to maintain sociogenic gaps and wear a face mask. However, there are so many peoples roaming in public places, it is difficult for the officers to inspect the people. Likewise allocating safety officers can increase the number of people in places and it additionally gives the opportunity of raising the transmission considerably more and putting peoples and officers in a more risky circumstance.

Utilizing our proposed system the problem can be solved and it reduces the manpower since it automatically recognizes people with face masks and without a face mask. Simultaneously it monitors people with maintaining socio genic gap and if any people violate the rule a voice alert will come to warn the people.

## 2. OBJECTIVES

The objective of the project is to develop a system that automatically monitors people in public places and that is flexible for all the environments. Our proposed model uses computer vision techniques to capture real-time safety violations of people from the video footage captured from public places to enhance people's safety. This study develops a model using CNN to detect people who violate the rules of wearing a face mask and maintaining the sociogenic gap in public places. Once a safety violation occurs, the model highlights them with red bounding boxes and a voice alert will come to caution the people.

## 3.MODULES DESCRIPTION

Our proposed system consist of four modules they are

- Data collection and preprocessing
- Model building and training
- Model testing
- Model Implementation

### 3.1. DATA COLLECTION AND PREPROCESSING

The proposed system use a custom data set consisting of face images with different types of face masks which are labeled and used for the training of our models.The real-time automated detection of sociogenic gap maintenance and the verification of persons wearing masks are detected using the model.Dataset is divided into two types training and testing dataset.The Training data set should consist of 80% images to train the algorithm effectively and for prediction accuracy. And the Testing data set should consist of 20% images to test the prediction accuracy of the algorithm and in preprocessing step there are two stages one for foreground and the other for background.Here we eliminate some objects in the background of the video using AHE(Adaptive Histogram Equalisatoin).Then for human detection we use the SVM algorithm, And for classification and analysis of face mask and social distance we use Decision Tree algorithm.These are the process we use in the first module of our proposed system.

### 3.2. MODEL BUILDING AND TRAINING

In model building and training we use feature extraction after preprocessing the image in the system. In the feature extraction, the system identifies the points in the face like mouth, eyes, and nose for face mask detection. And then it differentiates the parts of faces using statistical ROI (Region Of Interest) for segmenting the points in the face. In our proposed model we used the weights of the TensorFlow pre-trained object detection models for the model training. We used a live video captured from a public place to train our model using the SVM algorithm, which detects the human and face mask worn by them. The custom data set is loaded into the project directory and the algorithm is trained based on the labeled images.

### 3.3. MODEL TESTING

The proposed framework works in an automated way and serves to naturally play out the social distance investigation measure. Here we use TTS(Text to Speech) conversion method for getting the voice alert. Then we check the accuracy of the model on the test dataset by running the video which we have used as an input and it starts recognizing the people using the algorithm. For both networks of face mask detection and physical distance recognition, the model uses a python programming environment for executing the machine learning model and it includes some python open source libraries for training our model.

### 3.4. MODEL IMPLEMENTATION

The proposed model first detects all persons in the range of cameras and shows a yellow bounding box around each person who is

far from each other and after that, the model uses SVM algorithm for person detection, and then it conducts a check on the identification of social distances maintained in a public place. Here we use CNN for image preprocessing and classification of the dataset which we were given as an input. After the classification of the dataset, the system gives us the output video with bounding boxes and the social distance measurement value at the top of each person.

## 4.MODEL WORKING PROCESS

The above flowchart shows how our proposed model will work first we are going to give the input as a live video captured from a public place and it will read the frame of the video then it starts detecting persons after detecting it shows a yellow bounding box around each person and then it detects the sociogenic gap maintenance in public places with the number of distance calculated between each person, if persons violate social distance then a bounding box color changes to red for those persons and simultaneously face mask detection is achieved by showing bounding boxes on the identified person's face with mask or non-mask labeled. If the mask is not visible in the faces, and if the social distance is not preserved, then an alert sound with a voice will come to caution the people

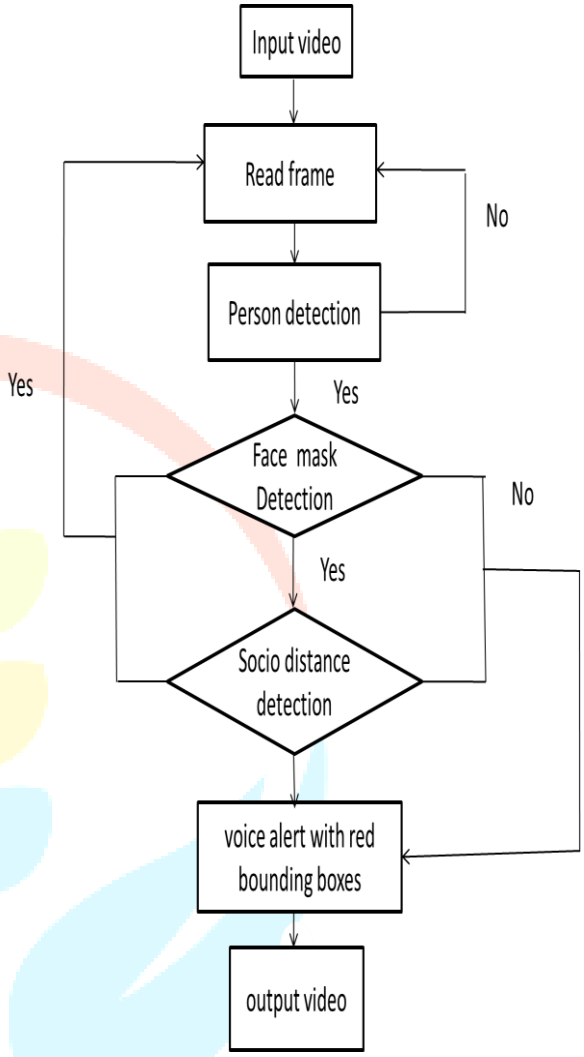


**Figure 4.1: Flow chart**

## 5. TECHNIQUES USED FOR IMPLEMENTING THE MODEL

Some techniques and tools we used for implementing the model are CNN,SVM (Support Vector Machine) algorithm,GLCM,Decision Tree algorithm.

a. CNN:

Convolutional Neural Network (CNN) is included different convolutional layers, a few pooling layers (for example min, max or

normal). Profound CNN organizations are commonly prepared on enormous marked datasets like ImageNet to select general highlights which are suitable into a few identifications and acknowledgment occupations like image classification and analysis, object recognition in the given input video. At the point when CNN engineering joins with various indicators which can keep distinctive segment of an object. To satisfy our work, various types of CNN design is utilized here.

b. SVM Algorithm

The SVM(Support Vector Machine) is a supervised learning algorithm which is used for classification and analysis of person detection in our proposed model. It is also used for image manipulation and feature extraction.

c. GLCM

The **G**rey **L**evel **C**o-Occurrence **M**atrix is used to find the pixel values in the image matrix and It is used in our proposed system to calculate the social distance between two people.

d. Decision Tree Algorithm

The vital benefit of this method is the point at which the dataset is tremendous and the quantity of data is high then it is imperative to track down the best highlights to part the dataset to perform proficient and ideal characterization.

## 6. SURVEY ANALYSIS

In Survey Analysis we have analysed some paper regarding the COVID-19 pandemic situation, contemplates have been directed to identify face mask and physical distance in the group of people. Militante and Dionisio[5] utilized the VGG-16 CNN model and accomplished 96% of precision to identify individuals who wear a face mask or not**.** Li et al. [6] applied deep learning object detection networks on video captured from drones to track moving objects. The data obtained from drones can be used to detect workers and identify whether they are wearing face masks and practice physical distancing.

Jiang et al. [7] employed a one-stage detector, called RetinaFaceMask, that used a feature pyramid network to fuse the high-level semantic information. They added an attention layer to detect the face mask faster in an image. They achieved a higher accuracy of detection comparing with previously developed models.

Girshick et al. [8], implements four steps;First, it selects several regions from an image as object candidate boxes, then rescales them to a fixed size image.Second, it uses CNN for feature extraction of each region. Finally, the features of each region are used to predict the category of boundary boxes using the model perform repetitive computation.

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***Figure 6.1: Training and Validation Accuracy***

The above graph shows the training and validation accuracy of more than 97% of our implemented model.

## 7. RESULT

Our proposed model acheives theaccuracy rate of 99% in the detecting process of wearing face mask and maintaing social distance .

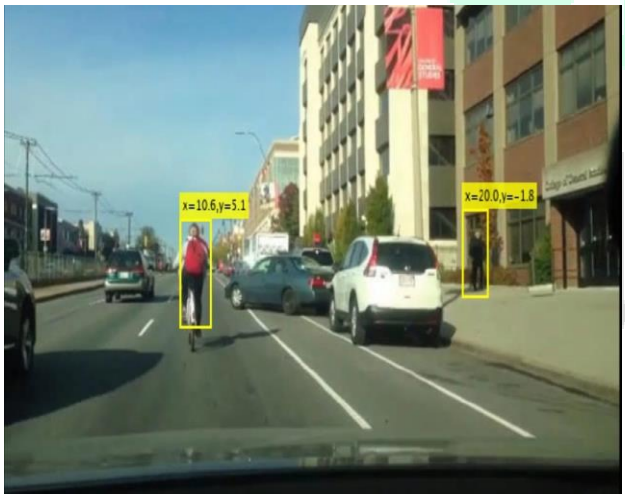


**Figure 7.1: Output 1**

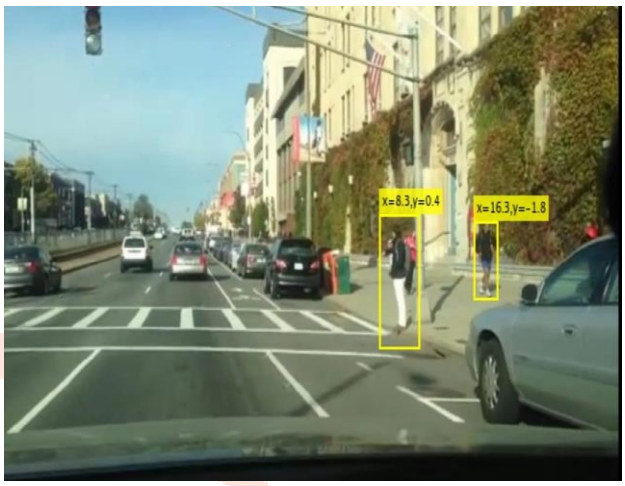


**Figure 7.2: Output 2**

## 8. CONCLUSION

Thus our proposed model helps in detecting face mask-wearing and physical distance maintenance among people to assure their safety in the COVID-19 pandemic and the system will operate efficiently in the current situation when the detecting process is eased and helps to monitor people in an automated manner. Moreover, the study presents a useful tool in fighting the spread of the COVID-19 virus by detecting a person who wears a facemask or not and gives a caution if the person is not wearing a facemask and maintaining a sociogenic gap. There are still a lot of scopes that are there for further improvement in the system like cough, sneezing prediction, and temperature screening so that the efficiency and productivity of the system can be improved and it helps a lot in the future enhancement.

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