

A PAPER ON FACE MASK AND SOCIAL DISTANCING DETECTION IN PUBLIC PLACES

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Abstract: Head pose classification is widely used for the preprocessing before face recognition and multi-angle problems, because algorithms such as face recognition often require the input image to be a front face. But affected by the COVID-19 pandemic, people wear face masks to protect themselves safely, which covers most areas of the face. This makes some common algorithms that cannot be applied to head pose classification in the new situation. Therefore, this paper established a method HGL to deal with the head pose classification by adopting color texture analysis of images and line portraits. The proposed HGL method combines the Channel of the HSV color space with the face portrait and grayscale image, and trains the CNN to extract features for classification. The evaluation of the MAFA dataset shows that compared with the algorithms based on facial landmark detection and convolutional neural network, the proposed method has achieved better performance.

Keywords: CNN,HGL, MAFA Dataset.

I. INTRODUCTION.

Presented that coronavirus disease 2019 (COVID-19) has globally infected over 2.7 million people and caused over 180,000 deaths. In addition, there are several similar large scale serious respiratory diseases, such as severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS), which occurred in the past few years Liu et al, reported that the reproductive number of COVID-19 is higher compared to the SARS. Therefore, more and more people are concerned about their health, and public health is considered as the top priority for governments . Fortunately, Leung et al. showed that the surgical face masks could cut the spread of coronavirus. At the moment, WHO recommends that people should wear face masks if they have respiratory symptoms, or they are taking care of the people with symptoms. Furthermore, many public service providers require customers to use the service only if they wear masks. Therefore, face mask detection has become a crucial computer vision task to help the global society, but research related to face mask and social distance detection is limited.

II.RELATED WORK.

There is lots of open-discussion about deep learning approaches for person detection, but there is no any theory about distance measurement between two persons. This inspires us to come up with a new algorithm to break this problem. We reviewed below related information and existing methods.

- ❖ An app was created called Face Mask Alert App it was developed and processed by Leeway Hertz software solution. This app sends an alert message to the users by enforcing them to wear masks.
- ❖ Some companies like Uber confirmed to CNN Business that it's required to cover the face with a mask for both drivers and passengers in any countries like India, USA the technology was developed to detect whether the drivers in Uber are following those rules.
- ❖ Febri Eye, a camera that comes with additional analytics with both social distance monitoring and face mask detection which generates an alarm or an alert in case of any violations. This technology was implemented by Telangana state, India.
- ❖ Widely used for face detection is the Viola Jones Face Detector which uses cascaded Haar features. Li et al., another model for face detectors, was a Multi-View Face Detector using features called surf.
- ❖ The core model for person detection is MobileNetV2. This model is used because it requires a framework to implement at a minimum speed of 3-4 frames per second. The advantage of this MobileNetV2 model is compute price as compared to a normal 2D convolution method.

Limitations

Many Image processing techniques were proposed to compute the distance between two persons like the Manhattan Distance Formulae. Another medium with 81% accuracy was also proposed to detect distance between two people by using the thermal rear camera of a smartphone that can work in a poor light environment.

Thus in our proposed model we use PCA, YOLO and CNN algorithm for detecting distance between two persons and also detection of a face mask of a person with 94% accuracy.

III.OBJECTIVES

- ❖ Face mask detection and face recognition.
- ❖ Distance measurement between people for social distancing.
- ❖ Alert the person who is not following the rules.
- ❖ Report mass gathering.
- ❖ Contact Tracing.

IV.METHODOLOGY

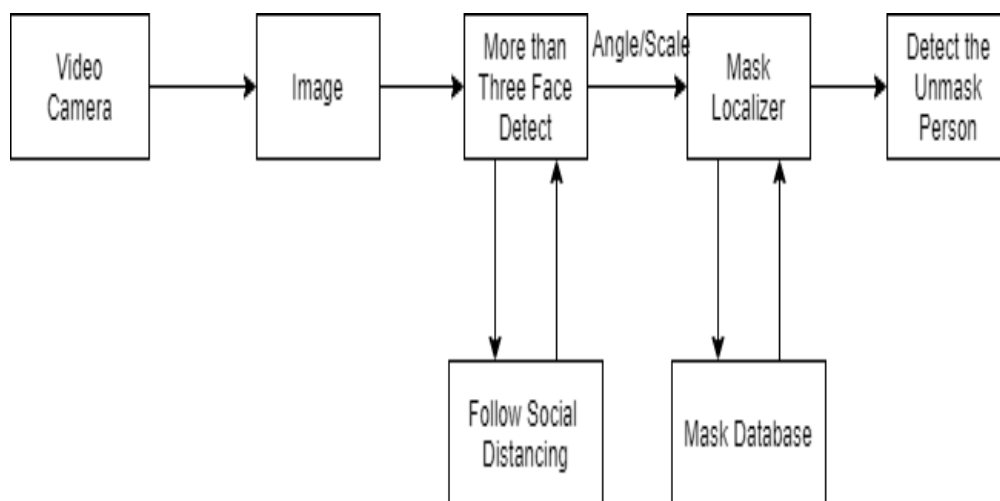


Fig: System Architecture.

• Admin

In this module, the Admin has to log in by using a valid username and password. After login successful he can do some operations such as View All Users and Authorize, View All E-Commerce Website and Authorize, View All Products and Reviews, View All Products Early Reviews, View All Keyword Search Details, View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

• View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

• View Charts Results

• View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

• E-commerce User

In this module, there are n numbers of users present. Users should register before doing any operations. Once a user registers, their details will be stored in the database. After registration is successful, he has to login by using an authorized user name and password. Once Login is successful, the user will do some operations like Add Products, View All Products with reviews, View All Early Product's reviews, View All Purchased Transactions.

PCA ALGORITHM

PCA is a statistical approach used for reducing the number of variables in face recognition. In PCA, every image in the training set is represented as a linear combination of weighted eigenvectors and eigenvalues (faces).

These eigenvectors are obtained from the covariance matrix of a training image set. The weights are determined after selecting a set of most relevant Eigen faces. Recognition is performed by projecting a test image onto the subspace

spanned by the eigen faces and then classification is done by measuring the minimum Euclidean distance. A number of experiments were done to evaluate the performance of the face recognition system.

YOLO ALGORITHM

YOLO stands for You Only Look Once, this algorithm is used for Object Detection as well as Object Tracking, this research uses YOLO for calculating the social distancing & identifying face mask on people's face with the help of Object Detection, whereas tracking the face and people in the frame for counting the objects and keeping a record of that object in the next frame is done by Object Tracking.

The minimum distance to keep while adhering to social distance is 6 Feet, keeping this as the base for calculating distance, the model was trained and used for object detection as well as object tracking.

This algorithm is a state of art, which works on a real-time system, built on deep learning for solving various Object Detection as well as Object Tracking problems.

CNN ALGORITHM

Convolutional Neural Networks(CNN) have a different architecture than regular Neural Networks.

Regular Neural Networks transform an input by putting it through a series of hidden layers.

Every layer is made up of a set of neurons, where each layer is fully connected to all neurons in the previous layer. Finally, there is a last fully-connected layer — the output layer — that represents the predictions.

Convolutional Neural Networks are a bit different. First of all, the layers are organized in 3 dimensions: width, height and depth. Further, the neurons in one layer do not connect to all the neurons in the next layer but only to a small region of it. Lastly, the final output will be reduced to a single vector of probability scores, organized along the depth dimension.

FUTURE SCOPE

❖ **Temperature Screening:** The proposed use-case can be equipped with thermal cameras based screening to analyze body temperature of the people in public places that can add another helping hand to enforcement agencies to tackle the pandemic effectively.

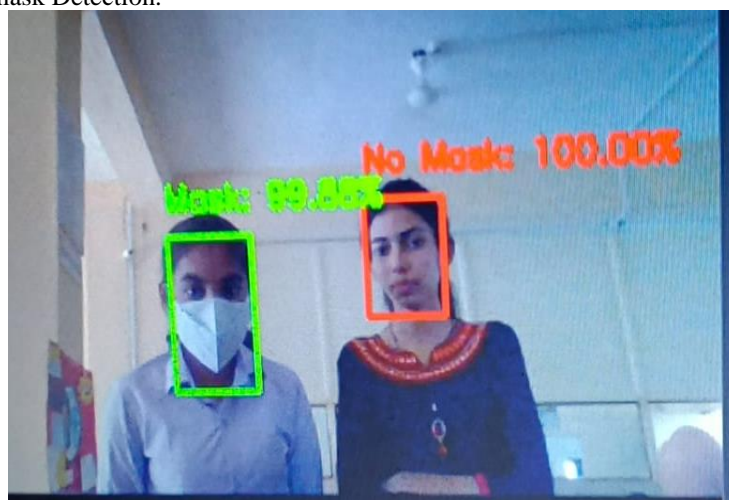
❖ **Coughing and Sneezing Detection:** Chronic coughing and sneezing is one of the key symptoms of COVID-19 infection as per WHO guidelines and also one of the major routes of disease spread to non-infected public.

CONCLUSION

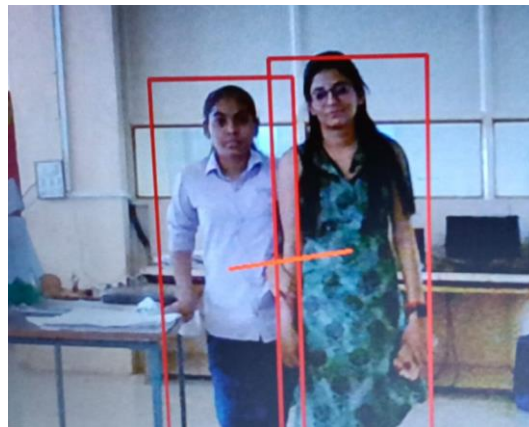
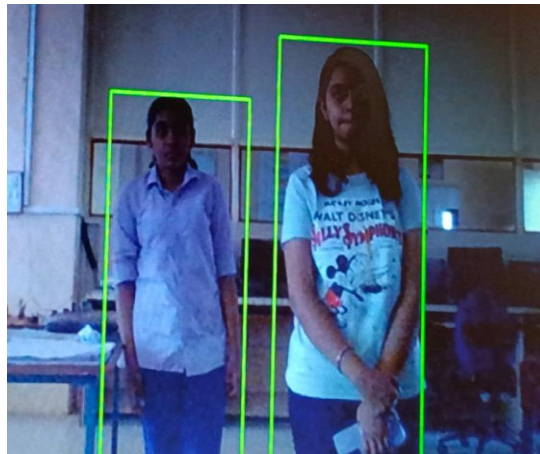
We will be building a model which will detect whether a person is wearing a mask or not and will also determine if people are maintaining social distance or not. If a person is found Covid positive, contact tracing for such cases is provided. Necessary actions will be taken against those who do not follow rules.

OUTCOMES

- Output of Facemask Detection.



- Output of Social Distance Detection.



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