

Detection of Face Mask

Dr. Sunita Panda¹, V. Sai Charan. K², Akhileswar³, AO Bhanu⁴ and Subahan Basha⁵

¹Assistant Professor, Department of Electrical, Electronics and Communication Engineering, GITAM School of Technology, GITAM Deemed to be University, Bengaluru

²⁻⁵UG Student, Department of Electrical, Electronics and Communication Engineering, GITAM School of Technology, GITAM Deemed to be University, Bengaluru

Abstract—Now a days face mask and social distancing places a lot of important role because we know that lot of countries are facing the problems due to avoiding of the face mask and social distancing. If we consider from the current situation in world the corona affecting people are 117 million and from the India the corona affecting people are 11.2 million. If we follow this then definitely we can decrease the number of cases in India and also in the world.

Now a days also the face mask and the social distancing playing the crucial from the corona virus. Coming to the Methods which involve in the two steps they are: the first one is the pedestrian, in video frames by using Deep Learning and the second one is distance between the two pedestrian is identifying by using image processing techniques. Mainly Convolution neural network is using widely. The accuracy and decision making is very high in convolution neural network compared to the others.

Index Terms— Face mask, Social Distancing, Video frames.

I. INTRODUCTION

Machine Learning which comes from the Artificial intelligence .This Machine Learning provides the ability to the automatically learn and improving from the experience. No need of any extra programming for this it learns automatically from their experience. If we give the data sets for training then it automatically learns from it and predict the future value. And it is categorized as supervised and unsupervised learning. For Machine learning it follows the process like input, Feature extraction, Classification, Output. And for the Deep Learning the Feature extraction and Classification comes as one unit.

It is a challenging task now a days for face mask and the social distancing. It is following by the lot of people now a days due to spreading of corona virus. Therefore the lot of countries are following the rule like No mask No entry. Many colleges, hospitals, Bustands, Railway Stations are following the same rule to prevent from this disease. It can be solved by using a traditional object detection method. The traditional face detection algorithm are used Viola-Jones Algorithm, Adaptive Boost algorithm and HOG. Here the object detection method is classified as multi-stage detectors and single short detectors (SSD). Faster RCNN is included in multi stages detectors and the YOLO (You Only Look Once) and single short detection (SSD) included in a single stage detectors. Here so many papers studied about face mask and social distancing detection. Several techniques are used for mask detection such as video analytic, image semantic segmentation, from finger prints, Discreet wavelet transform and local binary pattern.

All of these techniques are analyzed for checking a person wearing mask or not and also identifying the face recognition of a person. The work explains different methods used for face mask and social distance detection.

Proposed system has able to Detect faces and wearing mask detection and the performance was greatly improved with higher accuracy and robustness. It follows the detection approaches categories such as hardware, software, user collaboration. In hardware method uses an external hardware for creating a mask. Software based method uses Texture-analysis, The input RGB image is covered luminance and chrominance parts, DWT is processed these channel efficiently. Feature extraction process is carried out by using a Local Binary Pattern. The Support Vector Machine is going to analyze that weather it is a real or the fake image. Rabiul Islam, here analyzed the mask and the non-mask faced recognition. The data set used is the Olivetti and oracle research organization face database. Here PCA is used for feature extraction. The steps are used in this work includes Facial image Acquisition and Facial Feature Extraction using PCA and Eigen Vector Calculation. As a result it gives high recognition rate of face without mask.

II. RELATED WORKS

The Mask detection using semantic Segmentation proposed by the Toshanal Meenpal.Amit Verma and the Ashutosh Balakrishnan used a facial mask detection based on semantic segmentation. Here the class labels are named as face or non-face. The convolutional neural networks VGG-16 architecture followed by fully convolutional neural network is used for segmentation. As a result it recognizes multiple faces. This method is useful for frontal faces as well as non-frontal faces. As a result it is focused on removal of erroneous prediction. Here the performance of face mask and social distancing detection using a different deep learning classifiers can be analyzed mobileNet V2,ResNet 50, VGG 16, ADAM, SGD. These are the classifiers can be used for it. For each classifier followed by 3 optimizer and evaluate the performance. The optimizers here are used such as ADAM,SGD.

In 2020, Retinal face mask and the social distancing Detector proposed by Mingjie Jiang, Xinqi fan and Hong, here introduces a Retinal face mask and social Distancing detector. It is a one-stage object detector. The dataset contained 7959 images. The ResNet and mobile Net used as BACKBONE. But ResNet is considered as standard backbone. The detection network includes a backbone, a neck and head modules. As a result the ResNet accuracy is very much higher than the Mobile Net. It provides easier for reading the syntax other than the various languages for python. And python is the platform Independent. The proposed work is to detect and to classify the face mask and social distancing detection using a Faster RCNN model in convolutional neural network. The images are collected from the kaggle website. Contrast gets enhanced by using a function called the Image enhance in a python programming tool. Set the contrast rate as 1.5 for an image to process its contrast rate. The RCNN consists of important layers such as the Convolutional layers, Feature Maps, Region proposal network and ROI pooling layer. Where set of filters being used which is useful which is useful for detection the specific feature maps from the input image. It is denoted as a matrix.

III. PROPOSED SYSTEM

The main purpose of this proposed system is to detect the face mask and social distancing.

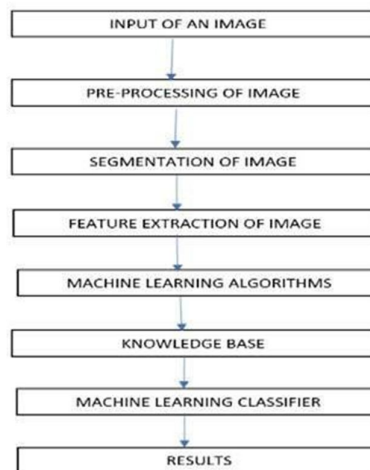


Fig. 1 Process for the proposed system

The paper propose a deep CNN framework to the detect and to label the underwater objects specifically face mask and social distancing detection using a faster R- CNN model in convolutional neural network. The development of R-CNN which is going to be perform the regression. Convolution layers extract the features from the an image and the generation of region proposals. And this is from the Convulutional feature map with more than one region proposals to detect the particular object. Extracting the image from the frames and load face detection model and finally we will get Face images.

The anchor boxes are just references, they are selected for the having different ratios. Such as buses, cars, shells, animals. In faster RCNN they used $k=9$ requesting three scales and three aspect ratios. Each regressor in the RPN only computes four offset values width,length (x,y)-centre to have the corresponding reference anchor box. The RPN uses a 3×3 window that slides over a high-level convolutional feature map. The effective size of that small window is actually 177×177 when reprojected back to the input layer, so the RPN is actually using a lot of context when making the proposals. This 3×3 window is resampled to a 256 dimensional vector before feeding into two connected layers computes the box offsets, and the box classification layer computes the confidence scores that are related to probability of objectness. The main two operations in the pooling layer are Average pooling and the maximum Pooling.

Classification means categorizing data and forming groups based on the similarities. In a dataset, the Independent variables or features play a vital role in classifying our data. There are many scenarios in which they are multiple categories to which points belong, but a given point can belong to multiple categoris

In results, it detects the face mask and the social distancing.

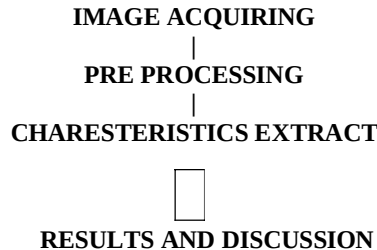
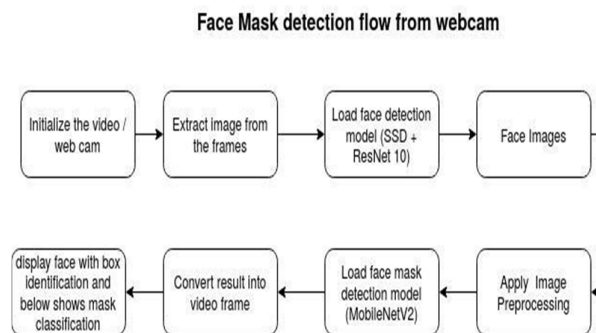


Fig.2 Classification

Initally we need to add the camera and face to the camera it is going to be detect the image later it is going to be detect weather the image is wearing mask or not if he wears the mask then it tells that the person is wearing the mask if not then it tells that the person is not wearing the mask and coming to the distance that if he stand close to the next person then it tells that the person is standing near that is he is not following the social distancing if not then it comes he is following.

The above diagram shows the flow diagram for the face mask and the social distancing from the webcam. It identifies by the layers.

Flow from Webcam

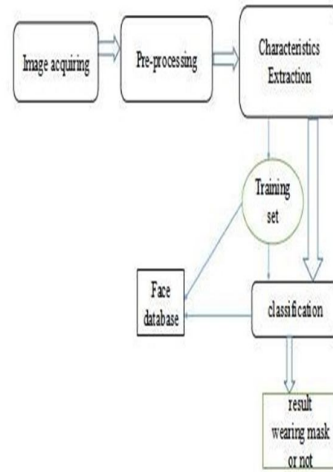


This figure shows that the steps to follow for the output, Initially we need to start the webcam of laptop and then it is going to extract the images from the frames, from this we are applying image processing. After this steps it is going to load the local face mask detection, then it shows wether the person is wearing mask or not.

Flow Diagram

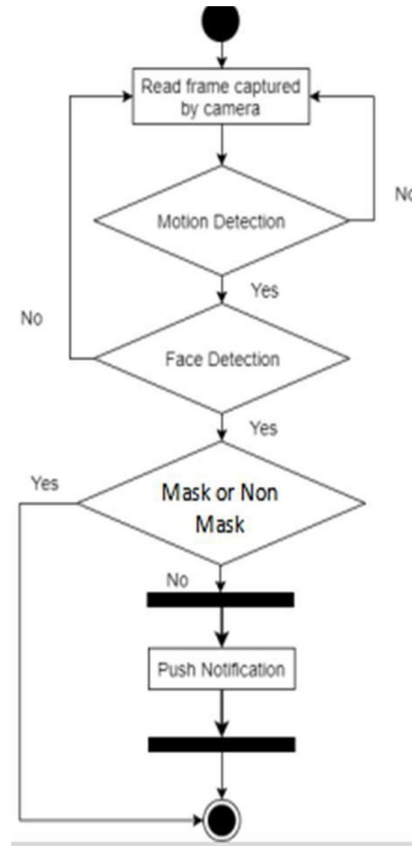
The below figure explains the internal process of the system. From the input image it is going to extract the characters of the image. By using that characters image is moving to testing. From that it is going to collect the face database, classification from them.

flow diagram



Use Case Diagram

The below figure explains the process after giving aninput to the webcam.



III. CONCLUSION

Initially we need to add the camera and face to the camera it is going to be detect the image later it is going to be detect weather the image is wearing mask or not if he wears the mask then it tells that the person is wearing the mask if not then it tells that the person is not wearing the mask and coming to the distance that if he stand close to the next person then it tells that the person is standing near that is he is not following the social distancing.

REFERENCES

- [1] Bogdan Kwolek, W-Pola 2 "Face Detection Using Convolutional Networks and Gabor Filters". Rzeszao University of Technology, Poland.
- [2] N. Ozkaya, S. Sagioglu "Intelligent face mask and social distancing Prediction System". 2008, IEEE International Joint Conference on Neural Networks.
- [3] Gayatri Deora, Ramakrishna Godhula and Dr. Vishwas Udpikar "Study of Masked Face Detection Approach in Video Analytics". 2016, IEEE Conference on Advances in Signal Processing.
- [4] Naveen S, Shihana Fathima R, Dr. R.S Moni, 2016 International Conference on Communication Systems and Networks.
- [5] Wei Bu, Jiangjinn Xiao, Chuanhong Zhou, Minmin yang and Chengbin "A Cascade Framework for Masked Face Detection". 2017, IEEE 8th International Conference on CTS & RAM Ningbo.
- [6] Kaihan Lin, Xiaoyong Liu, Huimin "Face Detection and Segmentation based on Improved Mask R-CNN", 2017.
- [7] Arti Mahore, Meenakshi Tripathi "Detection of 3D Mask in 2D Face Recognition System Using DWT and LBP". 2018, IEEE 3rd International Conference on Communication and Information System.
- [8] Md. Sabbir Ejaz, Md. Sifatullah, Md. Rabiul islam and Ananya Sarker "Implementation of Principle Component Analysis on Masked and Non-masked Face Recognition". 2019, IEEE 1st International Conference on Advances in Science, Engineering.
- [9] Toshnall Meenpal, Ashuthosh balakrishnan and AMit Verma. "Facial Mask Detection using Semantic Segmentation". 2019, IEEE 4th International Conference on Computing, Communication and Security.
- [10] C. Jagadeeswari and M. Uday Theja, "Performance Evaluation of Intelligent face mask and social distancing Detection System with Various Deep Learning Classifiers". International Journal of Advanced Science and Technology. Vol 29, 2020, P P3074-3082
- [11] Mingjie Jiang, Xinqi Fan and Hang Yan "Retinal face mask and social distancing Detector". 9 June 2020, Hong KongUniversity.
- [12] B. QIN and D. Li, identifying facemask-wearing condition using image super-resolution with classification network to prevent COVID-19, May 2020.
- [13] A. Nieto-Rodriguez, M. Mucientes, V.M. Brea, System for Medical mask detection in the operating room through facial attributes, Pattern Recognition Image Anal. Cham (2015) 138-145.