IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

REAL-TIME SURVEILLANCE BASED FACE MASK DETECTION USING DNN

[1]B. Dinesh, [2]CH. Shivasai, [3]K. Dineshkumar, [4]Dr. Sunil Bhutada, [5]Ms. Y. Rohita

[1,2,3]B. Tech Student, [4]Professor, [5]Assistant Professor

Department of Information Technology

Sreenidhi Institute of Science and Technology, Hyderabad, India

Abstract: The COVID-19 epidemic has had a dramatic impact on our daily lives, affecting global trade and transportation. Protecting one's face with a mask has become the new normal. Many public service providers will need clients to wear masks appropriately shortly to use their services. As a result, detecting face masks has become a critical responsibility in aiding worldwide civilization. This article proposes a simplified way to accomplishing this goal utilizing TensorFlow, OpenCV, and Scikit-Learn, as well as some fundamental Machine Learning tools. The suggested approach successfully recognizes the face in the picture and then determines whether or not it is covered by a mask. It can also recognize a face and a mask in motion as a surveillance task performance. Coronavirus illness 2019 (COVID-19) has infected over 20 million individuals worldwide, resulting in over 0.7 million fatalities, according to the World Health Organization's official Situation Report – 205. COVID-19 patients have reported a wide range of symptoms, ranging from mild signs to major sickness. Shortness of breath or trouble breathing is two examples of respiratory disorders. As they appear to be at increased risk, elderly adults with lung disease may experience substantial COVID-19 consequences. 229E, HKU1, OC43, and NL63 are some of the most frequent human coronaviruses that infect people worldwide. Viruses such as 2019-nCoV, SARS-CoV, and MERS-CoV infected people before they became disabled. Infectious beads can be spread by people with respiratory difficulties to everyone who comes into touch with them. The environment of a contaminated person might trigger contact transmission because virus-carrying droplets might land on his nearby surfaces.

Index Terms **– Convolutional Neutral Network, Image pre-processing, Data visualization, Average pooling, Mobilenetv2.**

I. INTRODUCTION

Face mask laws are becoming more widespread in public places all around the world. There is mounting scientific evidence that wearing a face mask might help to prevent the virus from spreading. However, there has been considerable opposition against face masks, posing a threat to those who enforce the laws. In certain places of India, they frequently store employees, just like everyone else.

This drives the development of a deep learning model that can detect whether or not a person is wearing a face mask. The efficiency of a face mask is determined by its kind. The model might be used to operate the automatic entrance at local shops or school buildings, which only opens to those wearing face masks.

Existing System:

A face is recognized from an image that has various properties in the face detection technique. Facial detection research necessitates expression recognition, face tracking, and position estimation, according to. The objective is to recognize the face in a single photograph. Face recognition is difficult due to the fact that faces change in size, shape, color, and other traits throughout time and are not immutable. When an opaque image is occluded by anything that isn't facing the camera, for example, it becomes a challenging assignment. The authors feel that occlusive face identification has two major challenges: a lack of big datasets that include both masked and unmasked motions, and a lack of big datasets that include both masked and unmasked motions. Protecting one's face with a mask has become the new normal. Many public service providers will need clients to wear masks appropriately in the near future in order to use their services. As a result, detecting face masks has become a critical responsibility in aiding worldwide civilization.

Our project uses some fundamental Machine Learning tools like OpenCV and Scikit-Learn to give a simple method to accomplish this goal. The suggested approach successfully recognizes the face in the picture and then determines whether or not it is covered by a mask. It can also recognize a face and a mask in motion as a surveillance task performance. On two separate datasets, the technique achieves an accuracy of up to 95.77 percent and 94.58 percent, respectively. We investigate optimum parameter values using the Sequential Convolutional Neural Network model to appropriately identify the existence of masks without overfitting.

Proposed System:

In this study, we offer an automated smart system for screening people who do not wear a face mask. All public spaces in the smart city are monitored by cameras. The cameras take photographs in public settings, which are then sent into a system that determines whether any people without face masks appear in the image. Any person who is not wearing a face mask is discovered.

A video or web camera is used to monitor the face mask throughout. The initial step in detecting the mask is to identify the face using the camera's collection of frames. The mask's location is then recognized and tracked in real-time. The processor receives the recorded image and processes it. It uses Open CV to transform the received picture into a digital signal. The alarm digital signal will be transmitted. Algorithms and dictionaries may be trained on a massive pool of masked faces, synthesis boring faces, and numerous misplaced expressions may be recovered, and the dominance of facial signals can be greatly reduced. According to the research published in, convolutional neural networks (CNNs) in computer vision have a tight size limitation for the input picture. To overcome the inhibition, the common approach is to reorganize the pictures before putting them into the network. The task's key problem is to accurately recognize the face from the image and then determine whether or not it has a mask on it. The suggested approach should be able to recognize a face and a mask in motion in order to execute surveillance activities.

II. LITERATURE SURVEY

2.2.1 Title: A Real time DNN - Based face mask detection system using single shot multi-box detector and MobileNetV2
Year: 31st December 2020
Author: Preethi Nagrash, Rachana Jain, Agam Madan, Rohan.
Description: A model named as SSDMNV2 has been proposed in this paper for face mask detection using OpenCV Deep Neural Network (DNN), TensorFlow, Keras, and MobileNetV2 architecture which is used as an image classifier. OpenCV DNN used in SSDMNV2 contains SSD with ResNet-10 as backbone and is capable of detecting faces in most orientations. While MobileNetV2 used provides for lightweight and accurate predictions for classification based on whether a mask is worn or not. SSDMNV2 performs competently in differentiating images having frontal faces with masks from images having frontal faces without mask.

2.2.2 Title: A Novel deep learning model on YOLO-V2 with RES-50 for medical face mask detection.
Year: 12th November 2020.
Author: Mohamed Loey, Gunasekaran Manogaram, Nour Eldeen.
Description: A novel deep learning model for medical face mask detection. The YOLO-v2 with ResNet-50 model achieves high average precision.

2.2.3 Title: Face Mask Detection Using Transfer Learning of InceptionV3
Year: 3rd January 2021.
Author: G. Jignesh Chowdary, Narinder Singh Punn, Sanjay.
Description**:** The proposed model is built by fine-tuning the pre-trained state-of-the-art deep learning model, InceptionV3. The proposed model is trained and tested on the Simulated Masked Face Dataset (SMFD). Image augmentation technique is adopted to address the limited availability of data for better training and testing of the model.

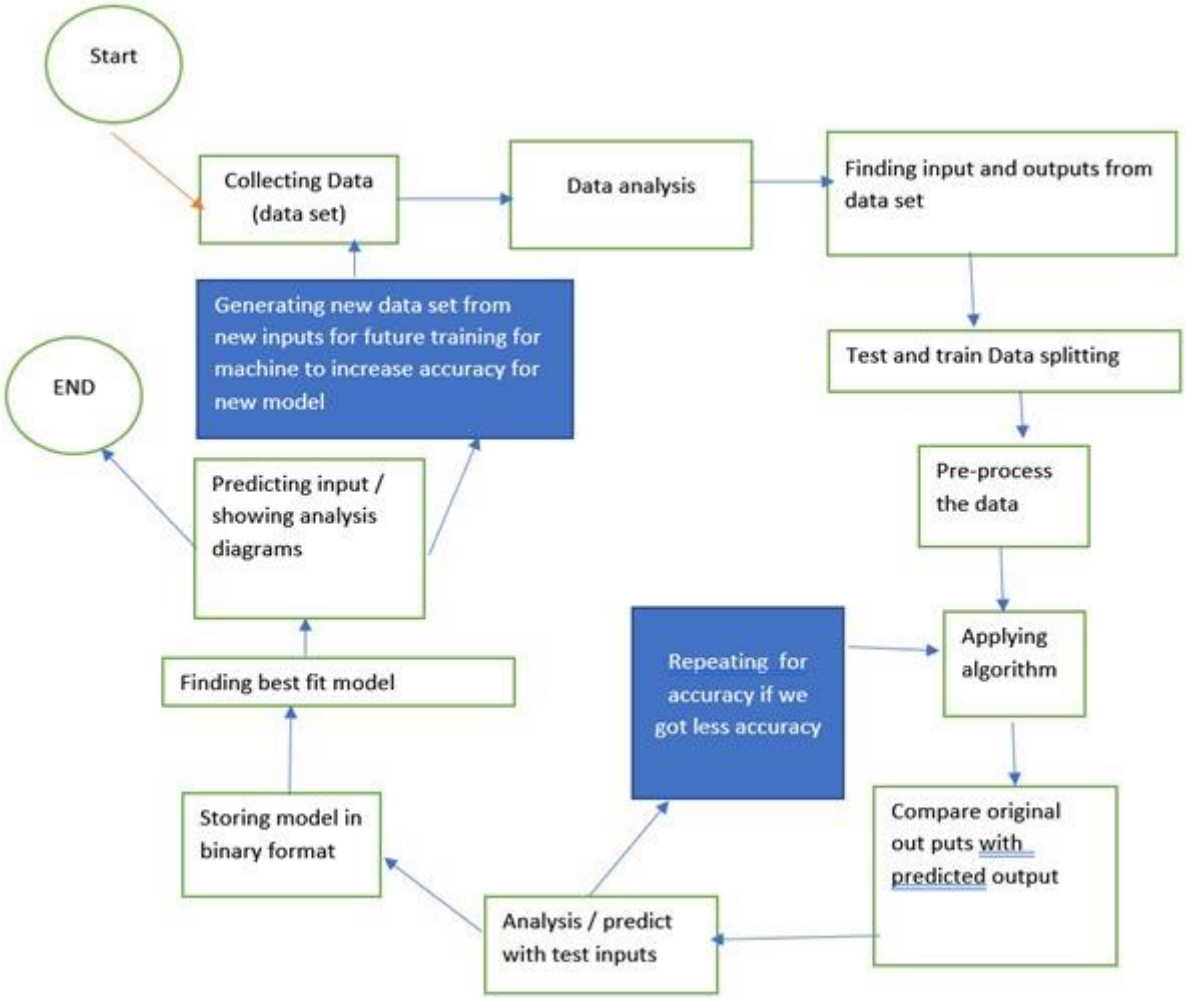
2.2.4 Title: Target specific mining of COVID-19 using one-class approach.
Year: 1st August 2020.
Author: Sanjay Kumar, Nagabhushanam.
Description: This paper proposes a novel cluster-based parallel one-class classification model to assign the most promising tasks to a group of relevant articles in available repository. The experiments have been performed with original and reduced features to justify the computational benefit of low-dimensional features. This section briefs the relevant background of data pre-processing, clustering, one-class classification and dimensionality reduction techniques, along with the published papers related to COVID-19 for research article mining techniques using CORD-19 dataset.

2.2.5 Title: Implementation of Principal Component Analysis on Masked and Non-masked Face Recognition.
YEAR: 4TH MAY 2019.
Author : Md. Sabbir Ejaz, Md. Rabiul Islam, Md Sifatullah.
Description: In this work a statistical procedure has been selected which is applied in non-masked face recognition and also apply in the masked face recognition technique. PCA is more effective and successful statistical technique and widely used. For this reason in this work, PCA algorithm has been chosen.

3.2 Data and Sources of Data

Data Set includes images of people with masks and without the mask. In total, we have a data set of images containing 1915 images of "with-mask" and 1918 images of "without-mask" and a total of 3883 images. As the final output purely depends on the data-set we have to analyze the output. If the data has noise it's becomes tough to analyze the output. So here we finalize the data from different sources by the combination of different data set sources and here we used "Kaggle Medical data-set".

III. SYSTEM DESIGN



IV. METHODLOGY

4.1 Image Pre-processing:

The images captured by the CCTV cameras required to be pre-processed before going on to the next phase. Because the RGB colour image contains a lot of redundant information that isn't needed for face mask recognition, the image is transformed to grayscale during the pre-processing step. An RGB colour image was saved with 24 bits per pixel. The grayscale image, on the other hand, included 8 bits per pixel and provided sufficient information for classification. To make the input photographs similar to the architecture, the photographs were moulded into a (6464) shape. The pictures are then normalized, with pixel values ranging from 0 to 1 following normalization.

4.2 Data Visualization:

The technique of translating abstract data into meaningful representations via knowledge exchange and insight finding through encodings are known as data visualization. It is beneficial to investigate a certain trend in the dataset. Both the ‘with mask' and ‘without mask' categories are used to illustrate the total number of photos in the collection.

4.3 Conversion of RGB image to Gray image:

Modern descriptor-based image recognition systems frequently function with grayscale pictures, without expanding on the color-to-grayscale conversion mechanism. This is because when utilizing robust descriptors, the color-to-grayscale approach has little impact. Incorporating non-essential data might increase the amount of training data needed to attain effective results. Grayscale is used for extracting descriptors rather than working on color photos in real-time since it rationalizes the approach and reduces computing requirements.

4.4 Image Reshaping:

A three-dimensional tensor is used as the input during image relegation, with each channel having a conspicuous unique pixel. All of the photos must be the same size and belong to the 3D feature tensor. However, neither pictures nor their related feature tensors are usually coextensive. Most CNNs can only accept photos that have been fine-tuned. This causes a slew of issues during data gathering and model implementation. This limit can be overcome by rearranging the input pictures before supplementing them into the network.

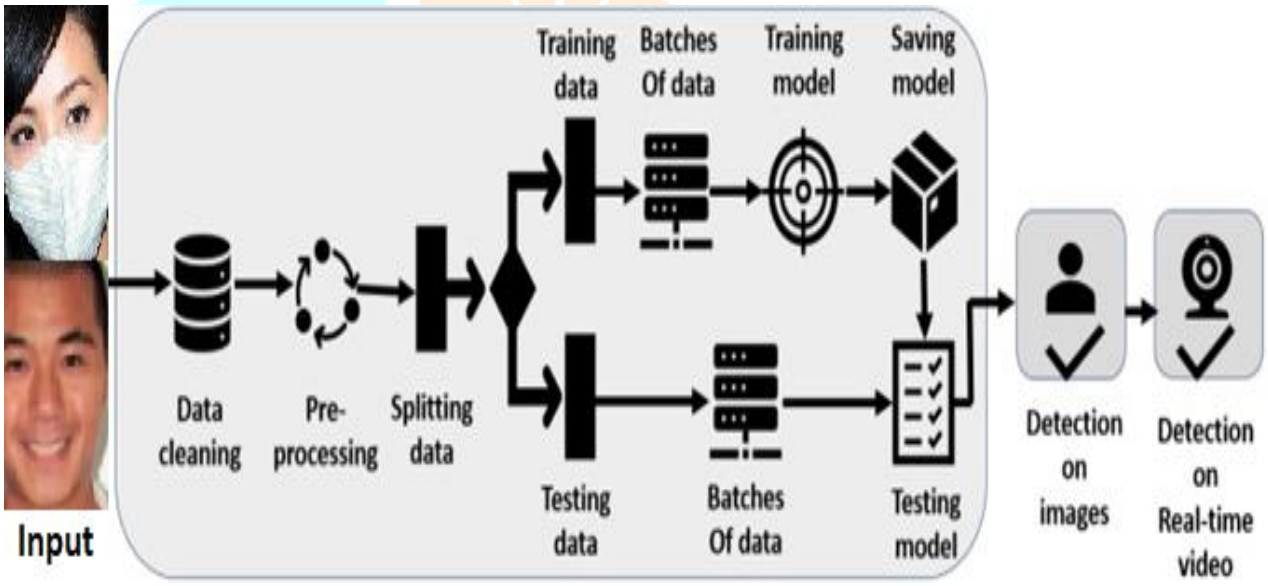
4.5 Convolutional Neural networks:

A Convolutional Neural Network (Conv Net/CNN) is a Deep Learning system that can take an input image, assign value (learnable weights and biases) to various aspects/objects in the image, and differentiates between them. When compared to other classification methods, the amount of pre-processing required by a Conv Net is notably less. While primitive methods require hand-engineering of filters, Conv Nets can learn these filters/characteristics with enough training.

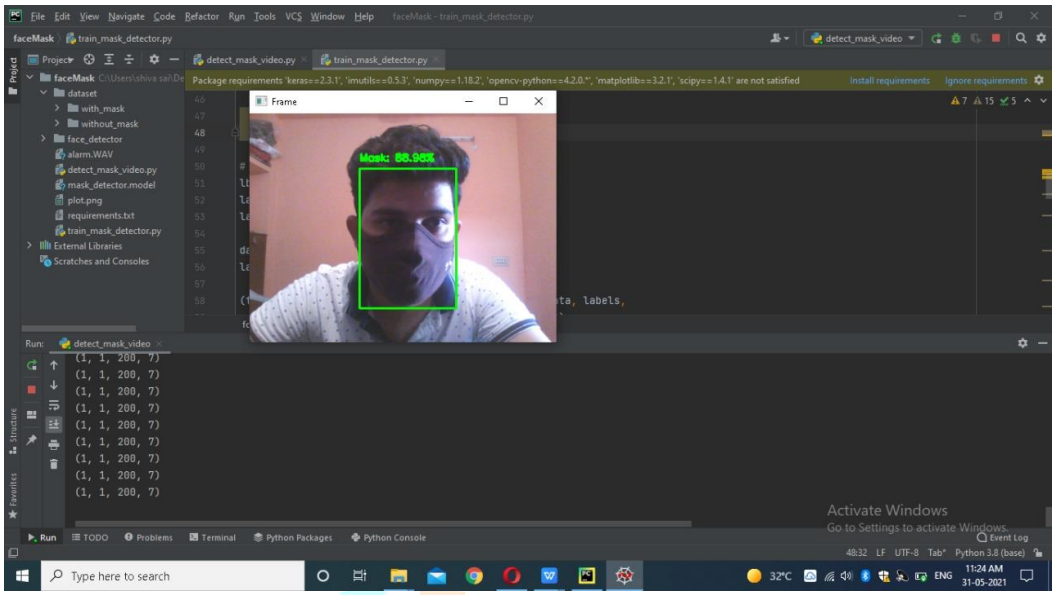
4.6 MobileNetV2:

MobileNetV2 is a Deep Neural Network that has been deployed for the classification problem. Pretrained weights of ImageNet were loaded from TensorFlow. Then the base layers are frozen to avoid impairment of already learned features. Then new trainable layers are added, and these layers are trained on the collected dataset so that it can determine the features to classify a face wearing a mask from a face not wearing a mask. The model is fine-tuned, and then the weights are saved. Using pre-trained models helps avoid unnecessary computational costs and helps in taking advantage of already biased weights without losing already learned features.

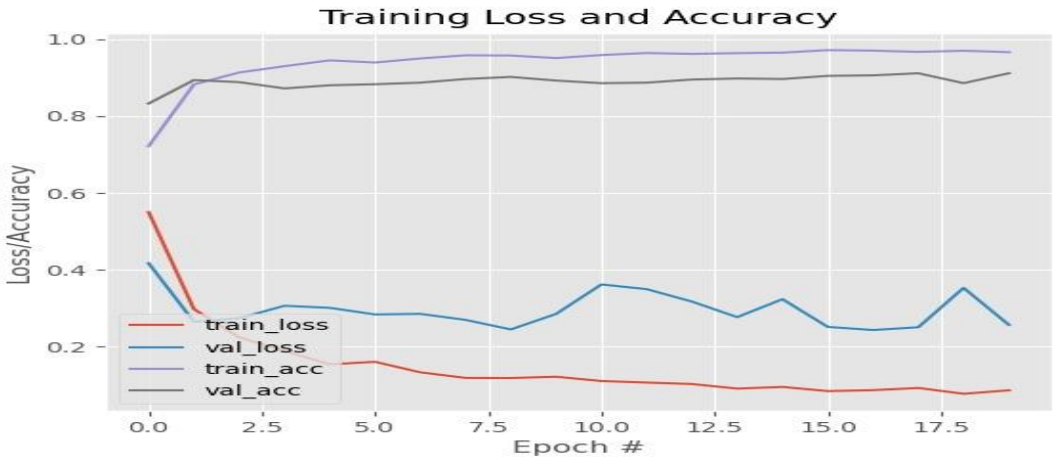
V.ARCHITETURE

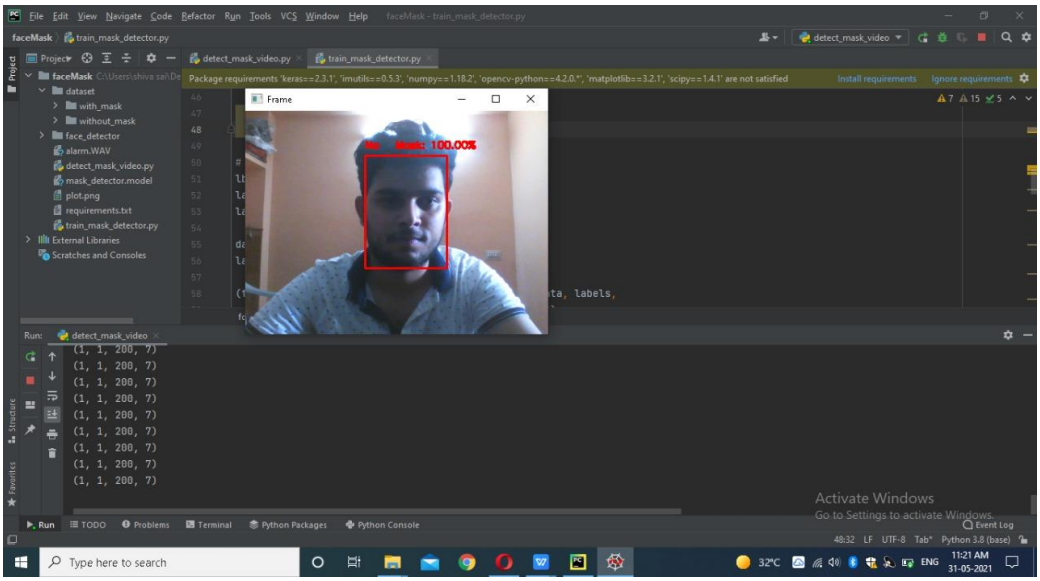


VI. OUTPUT



6.1 Graphical Representation of Train Dataset:





VII. CONCLUSION

Measures must be done to prevent the spread of the COVID-19 pandemic. We used SSD architecture and transfer learning methods in neural networks to create a face mask detector. We used a dataset of 1916 masked faces photos and 1919 unmasked faces photos to train, validate, and test the model. These photos were sourced from Kaggle and RMFD datasets, among other places. Images and live video streams were used to infer the model. This face mask detector can be used in a variety of settings, including shopping malls, airports, and other high-traffic areas, to monitor the public and prevent disease spread by determining who is following basic standards and who is not.

VIII. REFERENCE

1. https://www.leewayhertz.com/face-mask-detection-system/
2. https://www.tridentinfo.com/face-mask-detection-systems/
3. https://link.springer.com/chapter/10.1007%2F978-981-33-4236-1_16
4. https://ieeexplore.ieee.org/document/9342585
5. https://issivs.com/facemask/
6. https://www.sciencedirect.com/science/article/pii/S2210670720309070
7. https://www.sciencedirect.com/science/article/pii/S2210670720308179
8. https://www.sciencedirect.com/science/article/pii/S0263224120308289
9. R. Girshick, J. Donahue, T. Darrell, and J. Malik, "Rich feature hierarchies for accurate object detection and semantic segmentation," in Proceedings of the IEEE conference on computer vision and pattern recognition, 2014, pp. 580–587.
10. R. Girshick, "Fast r-CNN," in Proceedings of the IEEE international conference on computer vision, 2015, pp. 1440–1448.
11. S. Ren, K. He, R. Girshick, and J. Sun, "Faster r-CNN: Towards real-time object detection with region proposal networks," in Advances in neural information.
12. Rosebrock,A. ,2020.COVID-19: Face Mask Detector With Opencv, Keras / Tensorflow, And Deep Learning - Pyimagesearch. [online] PyImageSearch. Availableat:https://www.pyimagesearch.com/2020/05/04/covid19-face-mask-detector -with-opencv-keras-tensorflow-and-deep-learning/ .
13. W. Liu, D. Anguelov, D. Erhan, C. Szegedy, S. Reed, C.-Y. Fu, and A. C. Berg, "Ssd: Single shot multibox detector," in European conference on computer vision. Springer, 2016, pp. 21–37.