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RECOGNITION OF FACE MASKS USING VIOLA JONES ALGORITHM

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ABSTRACT

The Corona Virus has caused a huge impact across the globe. In order to reduce the spread of this virus, many precautionary measures have been implemented, such as wearing a facemask that covers your nose and mouth is one way to avoid exposure to the virus in a public setting. In this project, we propose a system that restrict the growth of COVID-19 by facial recognition and recognize if the person is wearing a facemask or not. To achieve this, we will use the "Viola Jones Algorithm". Viola Jones is a novel approach to rapid detection of objects running at a rate of 15 frames per second. This was the first to achieve real-time object detection. This algorithm can detect faces in real-time with impressive speed. Viola Jones is trained on a dataset that consists of images of people with and without masks. For this we create our own dataset by capturing images on the spot of the person like 200-300 images and use it as the dataset. Performance of this proposed algorithm is carried out on various real time inputs and then detect if the person is wearing a facemask or not.

Keywords: COVID-19, Viola Jones Algorithm.

I. INTRODUCTION

COVID-19's rapid spread in 2020 prompted the World Health Organization to declare it a global pandemic. The virus is spread by direct touch particularly in densely populated areas. Artificial Intelligence helps us in the Covid-19 battle from a variety of perspectives. Wearing a face mask is becoming extremely prevalent. Researchers have suggested that people should use masks to prevent the spread of COVID-19. Several countries established regulations to encourage their citizens to wear the mask. These law-related rules and regulations have been proposed to counter the quick raise in cases and mortality in several nations. It is difficult to develop a strategy for observing large groups of people. The use of advances in technology such as machine learning and artificial intelligence to resolve many basic concerns has made our lives easier. A few procedures are carried out by a CV algorithm for simple human perception. Computer vision is the study of how computers cope with data in the form of photos and videos. This trains computers how to extract characteristics from photos and videos. It also recognizes and categorizes the objects in the photos. In our system, this idea is applied to identify the face, which is then followed by recognizing the face mask present in the images that are used as input. CV has been shown to be a developmental aspect of contemporary innovation in anything from picture characterization to video inquiry. With the help of innovation, 'Work from Home' has replaced our regular work routines. We demonstrate a masked face recognition system that relies on Computer Vision and Machine Learning. This is combined with cameras to prevent the virus from spreading by identifying those who are not wearing a face mask. There will be two types of results: mask and no mask.

II. SURVEY ON RELATED METHODS

Thoshanlal Meenpal et al [1] (2019), proposed a system for Facial Mask Detection using the Semantic Segmentation. In this they present a technique to generate accurate face segmentation mask from any arbitrary size input photograph. Starting from the RGB photo of any length, the technique uses Predefined training Weights of VGG – 16 architectures for feature extraction. Training is carried out through completely Convolutional Networks to semantically segment out the faces present in that photograph. And they used Gradient Descent for training at the same time as Binomial cross Entropy is used as a loss function and FCN is processed to get rid of the unwanted noise and avoid the fake predictions if any and make bounding box around the face.

Their proposed version has additionally proven good effects in recognizing non-frontal faces alongside this it's

also capable to detect multiple facial masks in the single frame. Experiments had been executed on Multi Parsing Human Dataset obtaining mean pixel level accuracy of 93.884 % for segmented face masks.

Yoanna martínez-díaz et al [2] (2021), proposed a system for Accurate and Lightweight Masked Face Recognition. On this paper, they have a look at the effectiveness light-weight face reputation models for addressing accurate and efficient masked face popularity, considering both first rate-tuning on masked faces and specific pictures. For the experimental assessment, they create every actual and simulated masked face databases in addition to particular datasets. Significant experiments are performed to determine the satisfactory answer and country further steps for the studies network. The received consequences divulge that excellent-tuning gift face fashions on masked pics benefit higher performance than using precise-primarily based fashions. except, we compare and examine the effectiveness modern day the skilled masked-based fashions on nicely-set up unmasked benchmarks for face popularity and assess the performance brand new-the-art the used light-weight architectures in contrast with face models.

Md. Shahriar Islam et al [3] (2020), proposed a system to identify Face Mask using CNN. This research paper has proposed a completely fast image preprocessing with the masks in the censer over the faces. For classification and recognition of a masked individual, this system uses features extraction and a Convolutional Neural Network. This research work will be carried out in three levels: pre-processing the snap shots, cropping the snap shots and classification of the photos. This helps to come across whether the face is masked or not. A webcam or CCTV camera surveillance will continuously record and check to see whether the individual is wearing a mask, if the person does not wear a mask, then the system gives a protection alert.

Xinqi Fan et al [4] (2021), proposed a system using Deep Learning Based Light-Weight Face Mask detector with the use of Residual Context Attention and Gaussian Heat map to Fights against the COVID-19. In this paper, they propose a deep learning based single-shot light-weight face mask detector to fulfil the low computational requirements for embedded structures, in addition to gain excessive performance. To deal with the low feature extraction functionality because of the mild-weight model, they advocate novel strategies to beautify the version's characteristic extraction manner. First, to extract wealthy context information and cognizance on essential face masks associated areas, they recommended a novel residual context attention module. Second, to learn more discriminating features for faces with and without masks, they introduce a unique auxiliary task using synthesized Gaussian warmth map regression. Ablation studies show that those methods can notably raise the function extraction ability and for that reason growth the very last detection overall performance. Comparison with other models shows that the proposed version achieves results on public datasets, the AIZOO and Moxa3K face masks datasets. In particular, compared with another light-weight you only look once version three tiny version. On the AIZOO dataset, their model's mean average precision state is 1.7 percent higher., and 10.47% better on the Moxa3K dataset. Therefore, their proposed model has a high potential to make contributions to public health care and fight towards the coronavirus disease 2019 pandemic.

Suresh K et al [5] (2021), proposed a system for Mask Detection using Optimistic Convolutional Neural Network. This research takes a simpler technique for detecting facemasks and alerting the individual if they are not wearing one. The usage of Kaggle datasets, the proposed system/version is trained and examined. The system runs in real-time and detects if a person's face has facemask if not then notify the person personally through textual content message. Faces in public are analyzed live to extract masks that are fed into CNNs as inputs.

Isunuri B Venkateswarlu et al [6] (2020), proposed a system using Face Mask Detection using the MobileNet and Global Pooling Block. MobileNets with global pooling blocks have been presented in this paper for the detection of face masks. The proposed model utilizes a global pooling layer in order to flatten the feature vector. For classification, a fully connected dense layer is used in conjunction with a SoftMax layer. Their proposed model outperforms existing models on two publicly available face mask datasets in terms of essential overall performance metrics.

Harish Adusumalli et al [7] (2021), proposed a system for Mask Detection Using OpenCV. They proposed a method that uses TensorFlow and OpenCV to detect the presence of face masks on people. An outline around the person's face shows whether the person is wearing a mask or not. When a person's face is stored in the database, it detects the name of the person not wearing a mask and sends an email warning them that it is

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unsafe for them to not wear a mask in order to protect oneself.

Susanto et al [8] (2021), published a paper on Face Mask Detection for Preventing the Spread of COVID-19 at Politeknik Negeri Batam. This paper aims to develop a face mask detector which can detect any type of mask. Experiments were carried out using real-time telemetry, and the device was installed at Politeknik Negeri Batam. According to the results of the experiments, this device is able to detect whether people are wearing or not wearing the mask accurately even when they are moving around.

Md. Rafiuzzaman Bhuiyan et al [9] (2020), proposed a system using Deep Learning ti detect Face Mask for Human Safety with YOLOv3. In the paper section below, they have established that a person wearing a face mask or not can be trained based on the face mask image and the no face mask image. Under the experimental conditions, they used real-time video data for detection, localization and recognition. Experimental results show an average loss of 0.0730 after training 4000-time steps. The obtained map score is 0.96 after training 4000-time steps. This unique visual system of facial mask detection and classification achieved an output of 96% classification accuracy.

III. PROPOSED METHODOLOGY

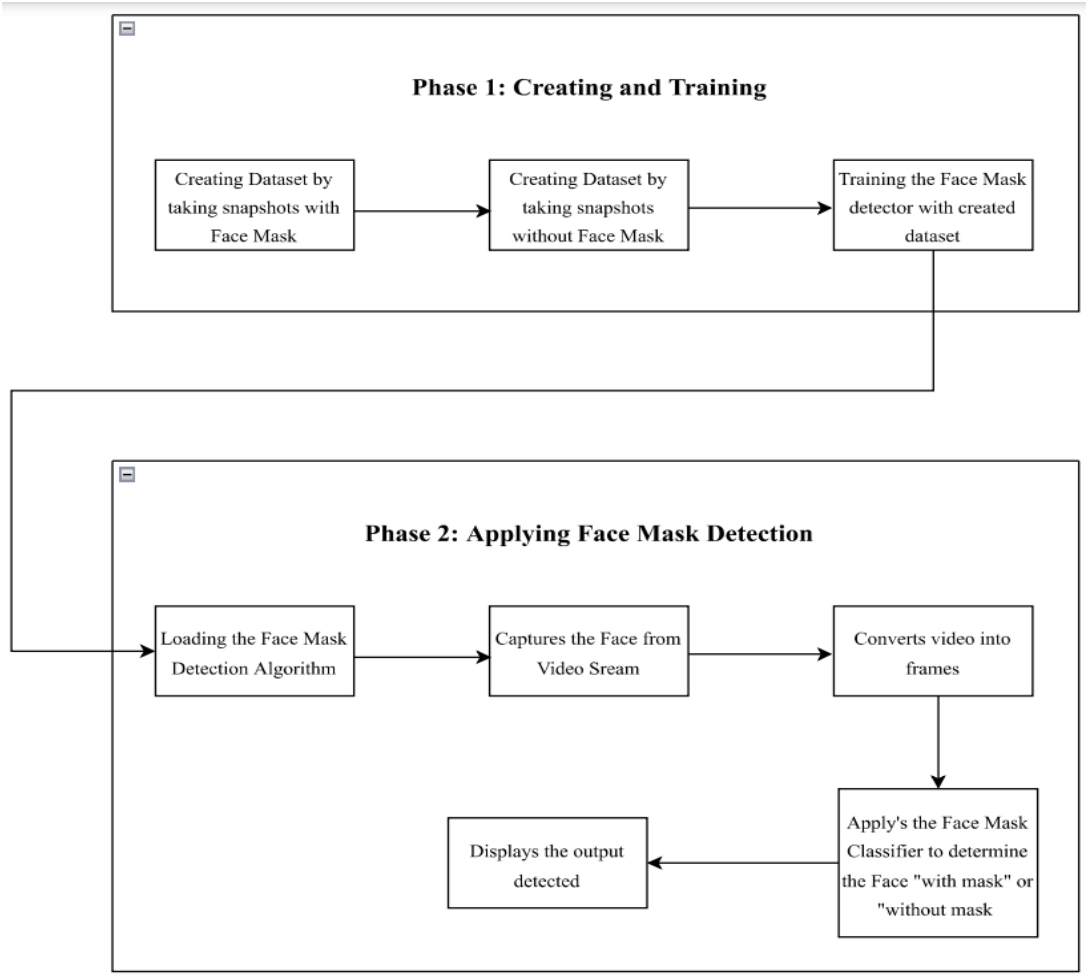

Fig. 1. Flow chart of face mask Detection

In this proposed system the Viola Jones Algorithm is used to detect face mask, where this algorithm offers excellent accuracy, takes less time to compute, classifies pictures faster, and is simpler to implement. This algorithm enables one to take 200-300 snaps as input of the faces with and without face mask. Viola and Jones created the face detection method in 2001. There are four stages to this algorithm: Haar Features Selection, Integral Images, AdaBoost, and Cascading Classifier. OpenCV module is used to deliver a real-time efficient Computer Vision library, tools and hardware. It also provides model execution for Machine Learning (ML). when we read any image using OpenCV it returns object of numpy array by default and using image shape It returns 3 which is the color channel of the image, as well as the height and width of the image. In actuality, the

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value of the array is the value of the color. Before implementing face mask detection problem, first we need to understand that how to handle images. Colors in the form of red, green, and blue make up an image. For a computer, we see an image containing some kind of shape or object, whereas we see a range of colors from 0 to 255. The final output will be displayed as a result. To begin with, install "Jupyter Notebook", it is the latest web-based interactive development environment for notebooks, code, and data. Its flexible interface allows users to configure and arrange workflows in machine learning. For the detection of face mask, we develop a code in python programming language in Jupyter Notebook. With the help of four stages of algorithm the camer activates and start to take 200-300 snaps of faces identified with mask and without mask live after running the code. Finally, the datasets have been created and is ready to detect the masked face and not masked face. When the person stands in front of the camera, the face of the person is detected during execution. If the person standing with face mask on, then the camera displays as "mask". The camera displays a "no mask" if the person is not wearing any face masks.

IV. RESULTS AND DISCUSSIONS

As we discussed, a face mask detection model has been developed and trained. And the result will be of two forms whether the person is with face mask or without face mask it is showed in the figure.

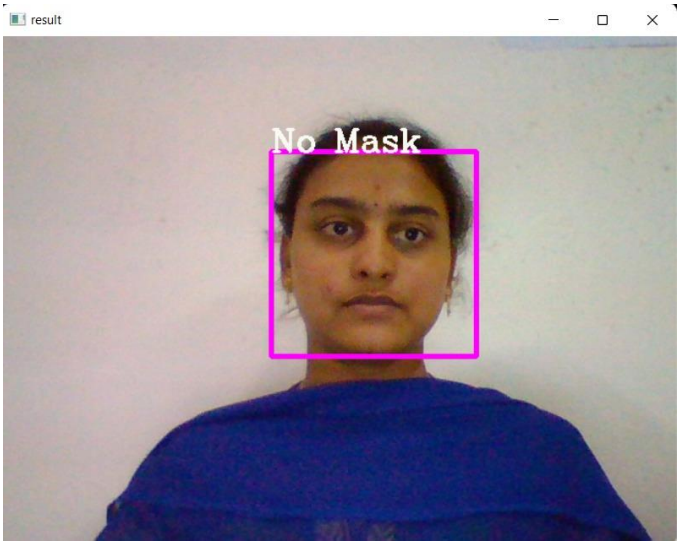

Fig. 2. Result showing 'No Mask', when the person is not wearing a mask

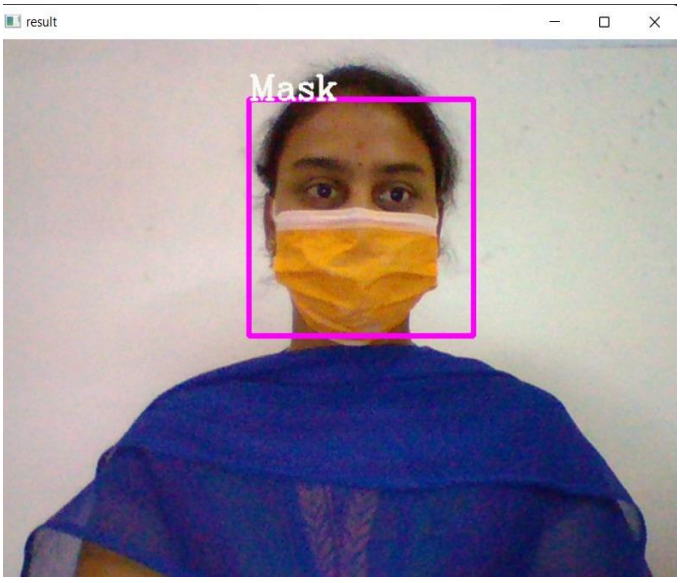

Fig. 3. Result showing 'Mask', when the person is wearing a mask

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V. CONCLUSION

This study describes the creation of an automated face mask detector. It has the issue of being unable to recognize faces in different illumination conditions. According to the camera's video. Viola-Jones continues to recognize the faces, but with a higher rate of false positives. Haar-Classifiers offer the benefit of doing both identification and classification at the same time, eliminating the requirement for a separate detection technique to extract the required information from an image and input it into a classifier. While this reduces computing time, it also reduces the amount of detail in the entities and surroundings. Despite the fact that Viola-Jones takes some training, it provides great accuracy, quicker image classification, and ease of use.

Our project can also be expanded by analyzing body temperature in the future, which is useful for restricting a person with fever symptoms as a symptom of the Corona virus. In addition, the project can be extended by adding the capability to detect when a person is wearing a proper face mask or an improper face mask.

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