Face Mask Detection by Using a Novel Detection Model and Machine Learning Analysis

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Abstract-Since March 2020, the world has been severely impacted by the coronavirus (COVID-19). The primary way that this coronavirus disease propagated was from person to person. Between respiratory droplets that are released when an infected person coughs, sneezes or speaks can spread between people who are in close proximity to one another. People close may get these droplets in their mouths or noses, or they may inhale them and get them in their lungs. Wearing a face mask is one of the precautions to lower the danger of this disease's viral infection, according to studies on the disease. It is required to wear a mask properly in many public and private settings since it can aid to avoid viral transmission. Where clients go to use those services, there are numerous public service providers. Therefore, it is not possible to manually verify whether or not a customer has worn a mask. This issue can be solved through technology. One of the most effective face mask detectors is the one we suggest in this work, which uses machine learning. Our device has a webcam or cameras built in and can recognize faces with and without masks. This system will assist in preventing safety violations and in maintaining a track of safety.

***Index Terms*--Corona Virus, Machine learning analysis, Face Masks, Face mask detection, Image processing, Safety improvement.**

I. INTRODUCTION

The COVID-19 pandemic is currently affecting the entire planet. In order to protect ourselves against the corona virus, several precautions are being taken by people. One of the most crucial preventative measures to stop the spread of the coronavirus is the use of a face mask. The COVID-19 virus is the subject of ongoing research, and investigations have shown that wearing a face mask can reduce the risk of viral transmission. A person who is wearing a face mask can also feel protected. In our houses, we take care of everything, but when it comes to public spaces like businesses, malls, colleges, and train stations, it might be difficult to keep people secure. Manually determining whether or not someone is donning a face mask is not practical. Machine Learning and Image Processing create a face mask recognition or detection system utilizing machine learning in order to stop the spread of Corona virus. This method of face mask detection works well. It has the ability to identify both masked and uncovered faces. With the invention of this system, it is possible to tell whether or not someone is wearing a face mask. The system will display a message such as "No Mask" if the person is not wearing a face mask; otherwise, it will display a message such as "Mask detected" or it will beep when the person without a mask approaches the camera. Additionally, it will greatly contribute to ensuring public safety to permit people to wear face masks inside. In the end, we're attempting to contribute some useful technology that can identify a face mask in the fight against COVID-19.

II. BACKGROUND AND RELATED WORK

The Face mask detection model, which is used in the training, validation, and testing phases, can be divided into two components for image processing and image extraction: deep transfer learning as a feature extractor and classical machine learning, which functions as decision trees. Tensorflow, OpenCV, and other cutting-edge computer vision and machine learning tools allow the system to concentrate solely on items that match those in the dataset. Both masked and unmasked faces have their data pre-processed when using the face mask detection approach. When a person enters an image or video stream,

a mask detector is applied to the image. Most of the photos were enhanced using OpenCV. Images already have names assigned to them, such as "mask" for faces with masks and "no mask" for faces without masks. In order to use this face mask detection technique, we record a picture using a camera and use image processing or computer vision to identify faces. Then we take pictures out of frames. Face mask detector will then be loaded. Image pre-processing will be used to execute an operation on images for detection. Image frames will be created from the appropriate results. For instance, if a person is properly wearing a mask, the system will display a message such as "Thank you for wearing a mask" along with a green signal. And the system will display a message like "please wear mask" with a red signal if the person is not wearing the mask or is not wearing it properly. Object detection is crucial to both image processing and computer vision. where objects are detected together with their location and background. The face object must be found in the face mask detection approach. Images of both faces with and without masks make up the dataset that can be used by this method. The search engine will be used to extract all of the photos. The training dataset, test dataset, and validation dataset are the three dataset categories for this dataset. Data is divided in order to prevent over fitting, which involves paying attention to inconsequential features or noise and only improves the accuracy of the training dataset. We need a model that excels on a dataset it has never seen before.

III. OBJECTIVES

In order to effectively stop the Corona virus from spreading, the " Face Mask Detection by Using a Novel Detection Model and Machine Learning Analysis
" project's major goal is to develop new detection technology.
These are the main goals that drove the creation of this system:

• Encourage the use of face masks to stop the spread of the Corona virus with the aid of technology that can identify face masks.
• Contribute to the essential safety measures for society by foreseeing COVID-19 outbreaks.
• Protect people's lives and maintain a secure workplace.
• To develop a model for a facemask detection system.
• To identify the real-time datasets of facemask detection.
• Machine learning performance analysis of the facemask detection

IV. PROPOSED METHODOLOGY

The proposed method focuses on using computer vision and machine learning algorithms to recognize a person wearing a face mask on an image stream. We use the object detector architecture suggested in, which offers a detection network with a mouth region, to construct an efficient network for face mask detection. The newly introduced model is made up of two primary parts: deep learning as a feature extractor in the first part, and decision trees as a traditional machine learning model in the second. Here, we'll build up the prerequisites and use the datasets. The system will save thousands of photos of faces with and without masks. Following data processing, a model will be trained using these pictures. After that, we'll run and check the correctness. As soon as the software is running, a webcam or camera will take a picture of the subject and measure the mouth area. Using traditional machine learning, it will decide whether the face has a mask on or not. If the face has a mask on, the message "Mask detected" will appear; otherwise, the device will beep and display the message "No Mask."

V. SYSTEM REQUIREMENT

Software
• System Installer: Anaconda.
• Operating System:
Windows 64 Bit - 457 MB/ Windows 32 Bit - 403 MB/Linux 64 Bit -529MB.
• Packages: tensor flow, keras, imutils, numpy, opencv-python, matplotlib, scipy. [Approximately 130MB].

Hardware
• Pc/Laptop (windows/Linux) (Min. 4GB Ram, 1GB Disk space).
• Webcam/Inbuilt camera of Laptop.

VI. CONCLUSION

This technology will be useful in effectively monitoring the use of face masks at workplaces during the COVID-19 epidemic. With the invention of this system, we can recognize a person's face mask and permit his admission into both the workplace and any location where a service provider is present. Due to its role in maintaining a healthy environment, this system also benefits institutions that provide public healthcare. To ensure that public safety rules are followed, this method can be applied in public

spaces such as airports, train stations, offices, schools, and public places. The measurement of how many individuals use masks and are aware of a safe environment will be aided by this " Face Mask Detection by Using a Novel Detection Model and Machine Learning Analysis
." Future improvements can be made to this system so that, in the event that someone must pay a fine for failing to wear a face mask while at work, they will receive a notification on their phone with regard to their ID.

VII. REFERENCES

[1]. Mohamed Loey; Gunasekaran Manogaran, Mohamed Hamed N. Tahad, Nour Eldeen M. Khalifa" A hybrid deep transfer learning model with machine learning methods for face mask detection in the era of the COVID-19 pandemic" 2020

[2]. Akhyar Ahmed, Saniya Adeel, Md Hasan Shahriar, Md Shohel Mojumder "Face Mask Detector" ResearchGate July 2020

[3]. Vinitha; Velantina; covid-19 facemask detection with deep learning and computer vision IRJET 2020 August 2020.

[4]. Tejal Nerpagar, Sakshi Junnare, Janhavi Raut, Aarti Shah, Prof. P.C. Patil, "Face Mask Recognition using Machine Learning" IJIRT December 2020.

[5]. Shiming Ge; Jia Li2; Qiting Ye; Zhao Luo "Detecting Masked Faces in the Wild with LLECNNs" 2017

[6]. Toshanlal Meenpal; Ashutosh Balkrishnan; Amit Verma "Face mask detection using Semantic Segmentation IEEE 2019".