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FACE MASK DETECTION USING CNN ALGORITHM USING DESIGN THINKING APPROACH

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Abstract: ***COVID-19 pandemic has disrupted global trade and movement, having an immediate impact on our day-to-day lives. Soon, many providers of public services will require customers to correctly wear masks to use their services. Wearing a mask lowers an infected person's risk, regardless of whether they show symptoms. As a consequence of this, assisting society everywhere by detecting face masks has evolved into an essential task. Wearing a mask is one non-pharmaceutical method that can be used to reduce the primary source of COVID droplets released by an infected person. The goal of this paper is to create a highly accurate, real-time method for identifying faces in public where people don't wear masks and forcing them to do so to improve community health. In this paper, we propose a strategy for recognizing individuals wearing and not wearing veils to stop the spread of Coronavirus, where all open areas are looked after by CCTV cameras. A deep learning architecture is trained with images of people wearing and not wearing masks from a variety of sources. Image processing analysis and machine learning methods can be used to assess the wear and tear on a face mask. The fundamental machine learning tools OpenCV and Scikit-Learn are utilized in this paper to simplify a strategy for achieving this objective. The face in the image is correctly identified and its mask coverage is determined using the proposed method. In addition, the risk percentage of those who are concerned will be displayed regardless of whether a mask is detected— whether it is worn correctly or not. As a performer of a surveillance task, it can also detect a face and a moving mask. The accuracy of the method can reach up to 95.77 percent.***

Keywords: ***CNN: Deep Learning, Object Identification, Face mask detection, Machine Learning, and Convolutional Neural Network Trainin***

1.INTRODUCTION:

The global spread of the 2019 Coronavirus disease, also known as COVID19, has everyone very worried. An infection spreads effectively and has killed individuals from one side of the planet to the other. The virus could spread through direct or indirect contact with the infected person, according to medical professionals. Consequently, measures like wearing face masks ought to be enforced. Face mask use among the general public is on the rise as a result of the global COVID-19 corona virus pandemic. Prior to Covid19, masks were worn by individuals to safeguard their health from air pollution. While others are self-conscious about their appearance, they conceal their feelings in public in order to conceal their faces. Because individual decisions have a direct impact on the effectiveness of stay-at-home orders at the society level, governments may refrain from implementing stay-at-home orders due to anticipated low compliance rates, particularly from socioeconomically disadvantaged individuals who do not have the luxury of staying home. Some governments may have also hoped that vaccinations and herd immunity from recoveries would completely prevent them from enacting such unpopular policies. In fact, 80% of respiratory infections can be avoided by wearing a mask. The World Health Organization (WHO) also recommends keeping people apart physically to stop the virus from spreading. This kind of virus is being combated by governments all over the world. Numerous organizations enforce face mask regulations for personal safety. Time-consuming and possibly contradictory, manually determining whether individuals entering an organization are wearing masks is time-consuming. Even though it has already been mentioned that wearing a face mask is the most effective way to stop the Coronavirus from spreading, it is hard for the government and other relevant authorities to make sure people wear masks in public places. Locating the face and determining whether or not it is covered in a mask is face mask detection. The issue is closely related to the problem of identifying object classes as a whole. The categorical process of identifying a particular class of entities, or faces, is

face identification. Fortunately, AI can be used as a tool, similar to using machine learning (ML) or deep learning (DL) algorithms to detect face masks in real time with the assistance of an existing camera network (surveillance camera network or any other). It is easy to deal with society's individuals, keep social separation, and guarantee that everybody has worn a facial covering. The purpose of this paper is to identify and delineate medical face masks in real images, as well as the subject's risk percentage level. Therefore, the objective of this work is to develop techniques for precisely identifying face masks that are worn in public. Additionally, it is challenging to distinguish public faces with and without masks due to the relatively small dataset for mask detection, necessitating extensive model training. The concept of transfer learning is utilized in this instance to transfer the learned kernels from networks trained for a similar face detection task on a large dataset. The dataset includes faces with and without masks, faces with and without masks in a single image, and confusing mixed images without masks. The proposed method used here consists of two steps. The face mask detector must first be trained before using transfer learning. In the second step, the trained face mask detector is used to determine whether a person in images or videos is wearing a mask. Then finally, the protection percentage of the person is shown, irrespective of whether they worn mask properly or not.

2. LITERATURE SURVEY:

Face Mask Detector - For object discovery reason Single Shot Indicator is been utilized. Face mask detectors can be placed in a variety of places, such as airports, shopping malls, and other places with a lot of traffic, thanks to this system. These detectors are used to monitor the public and identify individuals who are following fundamental guidelines and those who are not. This helps to prevent the disease from spreading. The process of loading data takes a long time in Google Colab Notebook. It made image and video stream testing difficult because it prevented access to the webcam. We have modeled a facemask detector using deep learning. We processed a system that is computationally efficient using MobileNetV2, making it simpler to extract the data sets. We use CNN architecture for improved performance. We can fix it with any model of camera.

Face Mask Detection using CNN and OpenCV - A face mask detection system keeps an eye on a person's face by automatically taking pictures with the cameras and determining whether or not the face is completely covered by a mask. Automatically determining whether a person is wearing a mask will be easier with this system. Computer vision employs the Eigenfaces method for face mask recognition. The system can be used to improve the model so that it can, for instance, detect transparent masks.

Deep Learning Tools and CT Image-Based COVID-19 Detection – A medical maging technique that is utilized in radiology to obtain detailed images of the body for the purposes of diagnosis is the CT scan, also known as a computed tomography scan. COVID-19 testing can be carried out quickly and precisely by utilizing CT scan images and deep learning tools. Numerous projects have been carried out in this setting. There are 349 images in the dataset that correspond to patients with COVID-19 and 463 images in the dataset that correspond to patients without COVID-19. In order to assist in diagnosis, Shah proposed distinct deep learning methods for distinguishing CT scan images of COVID19 and non-COVID-19. There were three sets of these pictures:10 percent for testing, 10 percent for validation, and 80 percent for the training set.

Real-time face mask recognitionwith an alarmsystem Using Deep Learning - This method quickly and accurately detects facemasks. Raspberry Pi-based real-time face mask recognition that takes a picture of the face. This system uses VGG-16's architectural features as the foundation network for face recognition. Deep learning techniques are used to build a classifier that will collect images of a person wearing and without a face mask. The architectural features of CNN serve as the foundation network for face detection in the study we propose. It can accurately tell the difference between people who wear face masks and those who don't, making it a useful tool in the fight against the COVID 19 virus.

3. PROPOSED SYSTEM:

ML is the expectation which is shown utilizing information. It is a man-made brainpower subfield, which numerically improves data over as extra data as incorporate estimation the presentation of the structure is gotten to a higher level. Directed learning is the prescient factors or elements are utilized to depict various data of interest or tests in regulated learning, and the objective variable's information are coordinated in a table. Unaided learning is a Machine Learning task that includes tracking down secret examples in unlabeled information. Game directed learning is the method involved with building a model that can foresee the objective variable. Support learning is a specialist which can consequently sort out some way to improve their conduct given an arrangement of remunerations and disciplines. Support gaining draws motivation from social brain research. RL includes the connection of machine or programming specialists with a climate. PC Vision is either a logical innovation in which machines that see it get data from pictures or a field that incorporates handling, dissecting, and understanding pictures by and large, high-layered information from this present reality, to deliver mathematical and representative data.

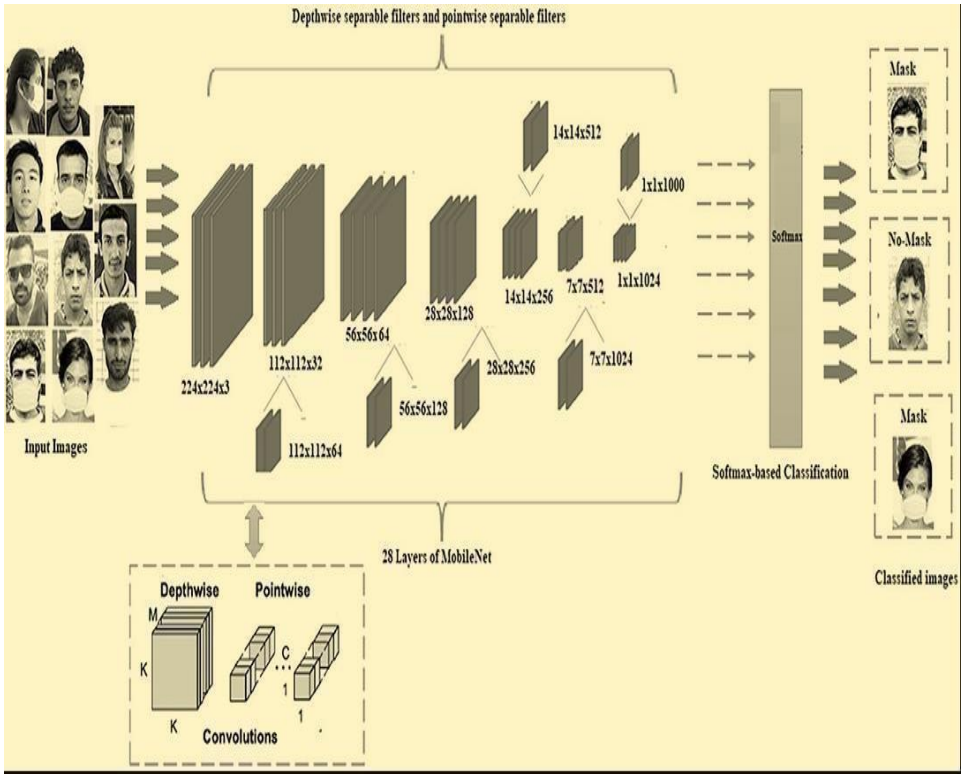

Figure 1 ***Depicts the internal process***

4.CONCLUSION:

COVID-19. The situation's rapid transformation and spread made it difficult to control. One of the most important ways to stop the virus from spreading is to wear a face mask in public places. This study used a deep learning-based approach to detect the face mask automatically. This paper aims to provide a comprehensive analysis of the various strategies for putting in place such a complicated detection system. After examining all implementation methods, it is safe to say that deep learning has recently gained popularity among researchers. In addition, the RMFD dataset is extensively utilized despite its availability. If used constructively, the model's implementation in public spaces could be beneficial. The proposed system has the potential to be enhanced for use in future projects by incorporating automated thermal detection systems. Another important parameter that was found in this paper may be included in the system as a check to see if social distance is being used in crowded areas. A facial landmark detection feature could be added for biometric purposes. Due to their adaptability, cutting-edge methods' architectures can also be improved to produce better results at a faster rate. The enormous utility of these methods could be used in a lot of future studies in this area. The quality of the dataset could be improved by removing images with insufficient light. Nevertheless, a model could be incorporated into the system to assess whether individuals maintain a sufficient physical distance from one another. Additionally, it could be paired with a design that identifies a person's mask type. Additionally, novel approaches to feature extraction could be investigated with the help of machine learning algorithms. In the future, we will embed real-time video streams into the dataset, which will increase its size, in order to detect face masks in real time

5. FINAL OUTPUT DEMO IMAGE:

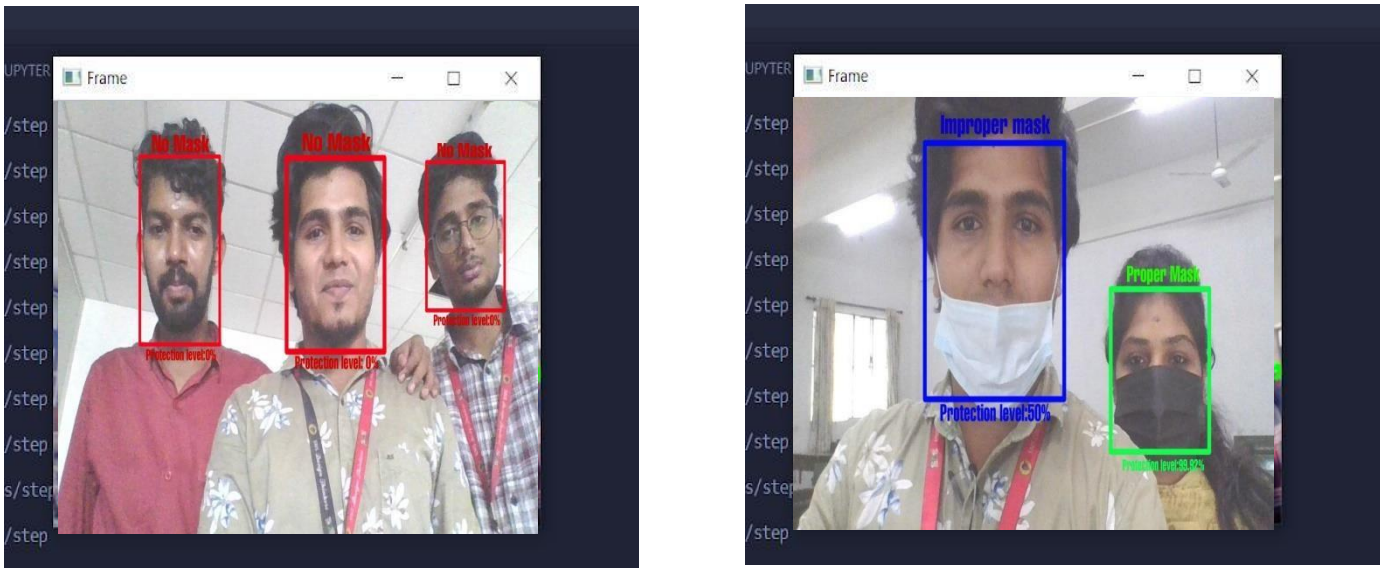

Figure 2 Sample Output

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