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A REVIEW ON FACE-MASK DETECTION USING MACHINE LEARNING

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Abstract: COVID-19 has had a significant impact on the world. Wearing a face mask is one of the precautions to lower the risk of viral transmission, according to studies. Moreover, many public areas and public service providers demand consumers to use the service and location only if they correctly wear masks. As a result, manually tracking the consumer to see if they have the mask or not is impossible. That is why technology is so important in this situation. Face mask detection via image processing is one of the high-accuracy and efficient face mask detectors proposed in this paper.

Index Terms **– Tensorflow, Object Detection, Face Mask Detection.**

I. INTRODUCTION

COVID-19 epidemic is currently affecting the entire w0rld. To control the spread of the Corona virus, people are utilizing a variety of strategies. There are numerous critical precautions that must be taken to combat COVID-19, one of the most significant of which is the use of a face mask. COVID-19 is still the focus of numerous of research and studies. Wearing a face mask has also been shown to significantly lessen the problem of infections in studies. A consumer wearing a face mask also perceives a sense of safety. We deliberately lookout of everything in our homes, but ensuring the security ofpeople in public areas such as offices, malls, colleges, and other places is more challenging. Therefore, manually determining whether or not a person is wearing a face mask is not possible.

In this particular project, This technologies have been developed to detect whether or not a person is wearing a face mask. If the user is also not wearing a face mask, the user will receive a message such as "No Mask," else "Mask detected. Many governments throughout the world are interested in using face recognition technology to secure public spaces such as parks, airports, bus stops, and train stations, among other points. One of the well-studied real-life difficulties is face recognition. The system with detect and recognize the objects and present the same to the user in an audio format.

II. PROBLEM STATEMENT

- A Security guard will be tasked will staring at two or more screens using typical video monitoring methods. It is a difficult job for a person to successfully oversee everything.

- We want to create a system that can efficiently recognize face in real world videos and determine whether or not the discovered faces are wearing masks.

III. PROPOSED SYSTEM

In Various convolutional layers, many pooling layers, non-linear layer, and classification layer units make up a Convolutional Neural Network (CNN). profound CNN systems are regularly prepared on huge named datasets like ImageNet to extricate common characteristics that can be utilized in a variety of detection and recognition tasks, ranging from image classification and validation to object recognition, segmentation, and texture classification. As CNN architecture is used with numerous detectors, various portions of an object can be contained. These structures have also given state-of-the-art results in the domain of fine-grained identification, such as recognizing a dog class, bird species, or car model. Larger the data set, the greater is the accuracy of the trained model, which is very much mandatory to achieve better object detection.

CNN is capable of extracting various local key features from data, selecting global training components, and has been effectively applied to a wide range of pattern recognition applications. Scaling, moving, and rearranging are all possible with the deep CNN. Different kinds of CNN architecture are used to complete our work.

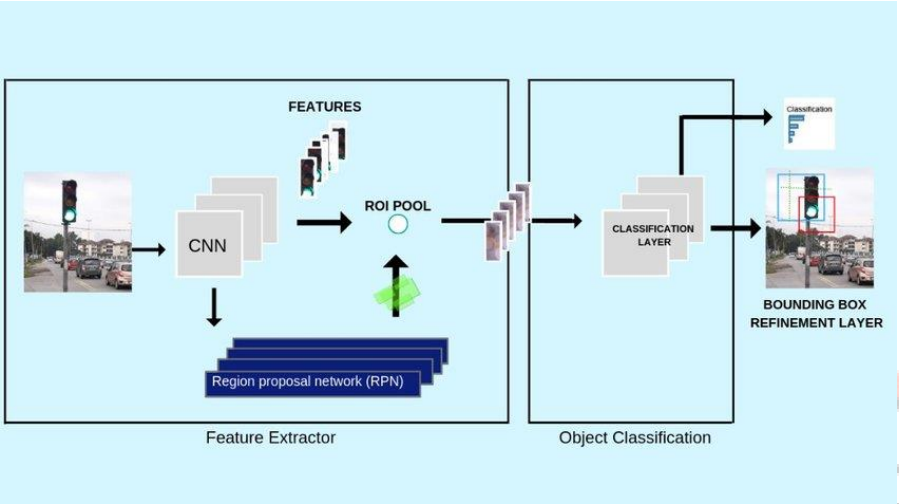

Figure 1. Convolutional Neural Network

3.1 R-CNN:

As shown in Figure 2, it is a region-based technique that employs CNN. AND a mean average precision (mAP) of 53.7 percent, an improvement of more than 30%.

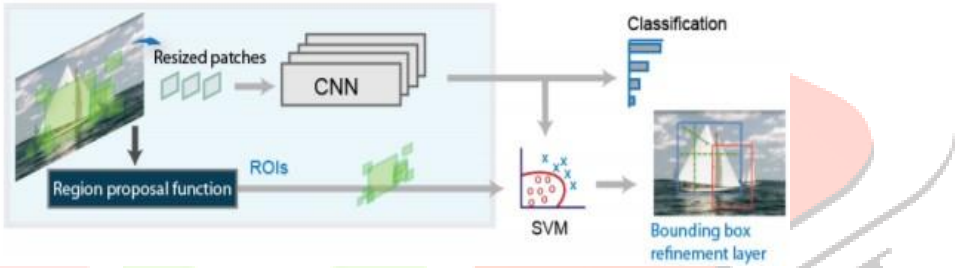

Figure 2. R-NN: Regions with Convolutional Neural Network

3.2 FAST R-CNN:

Ross Fast R-CNN was created by Ross Girshick [3], and it is an improvement on R-CNN. Figure 3 shows how Fast R-CNN processes the entire image to detect extracted features, which are then passed to the RoI layer to find regions of interest . The ultimate result is made up of probabilities of the protest within the outline existing, which are at that point sifted based on a predefined edge.

All network layers training is completed in a single step. It reduces storage capacity while also improving accuracy and efficiency through better training schemes. Fast R-CNN has the disadvantage that, while it improved object detection performance, it is still too slow to be used in real-time object recognition applications.

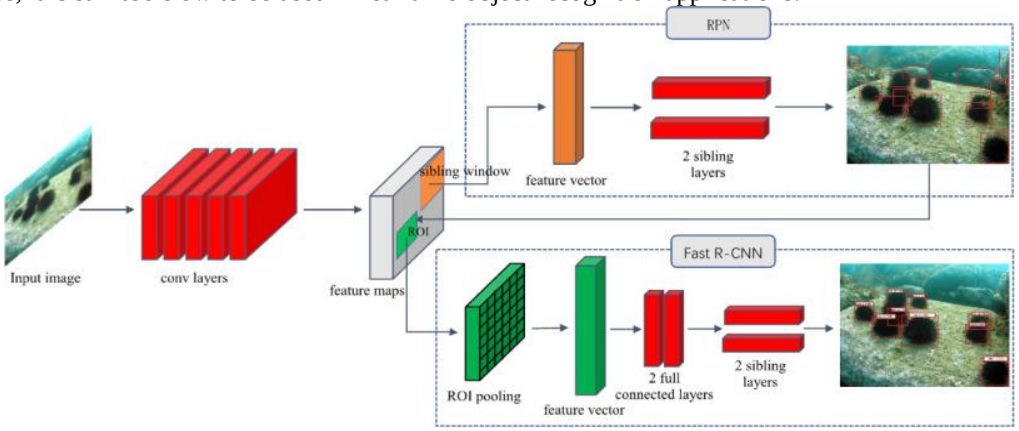

Figure 3: Fast R-CNN

3.3 FASTER R-CNN:

Faster R-CNN is an enhancement on the Fast R-CNN algorithm created by Shaoqing Ren, Kaiming He, Ross Girshick, and Jian Sun. It consists of two modules: a deep convolutional network based on regions and a Fast R-CNN detector that use these areas.

For object detection, this system creates a uniform network. This algorithm is incredibly fast because the time spent on each image is decreased to 10ms. This strategy, however, requires a lot of computation, making it unsuitable for applications that must run on CPUs with limited processing capability.

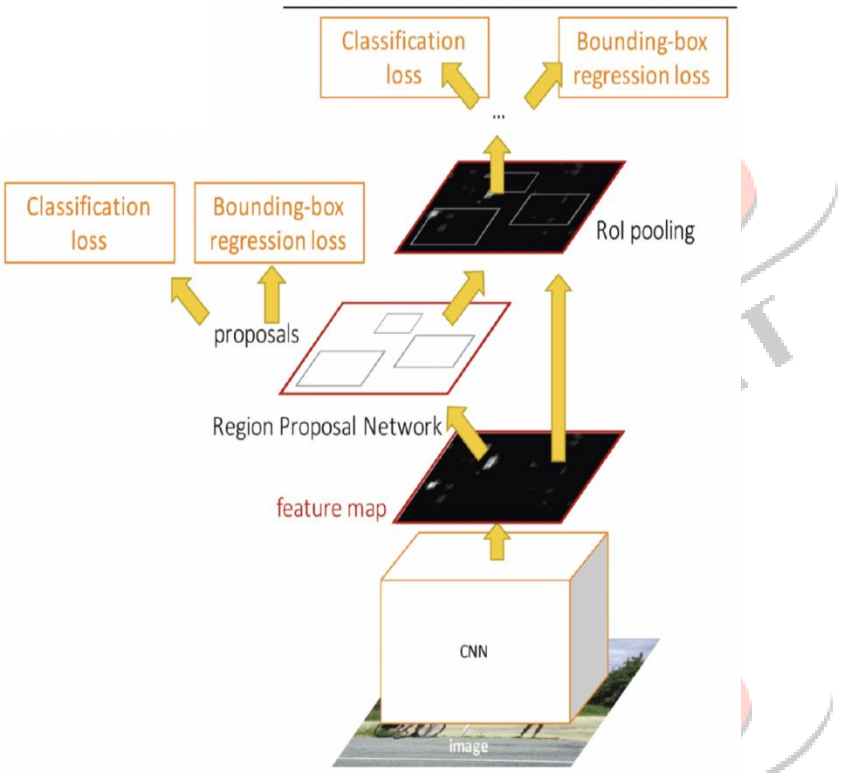

Figure 4: Fast R-CNN.

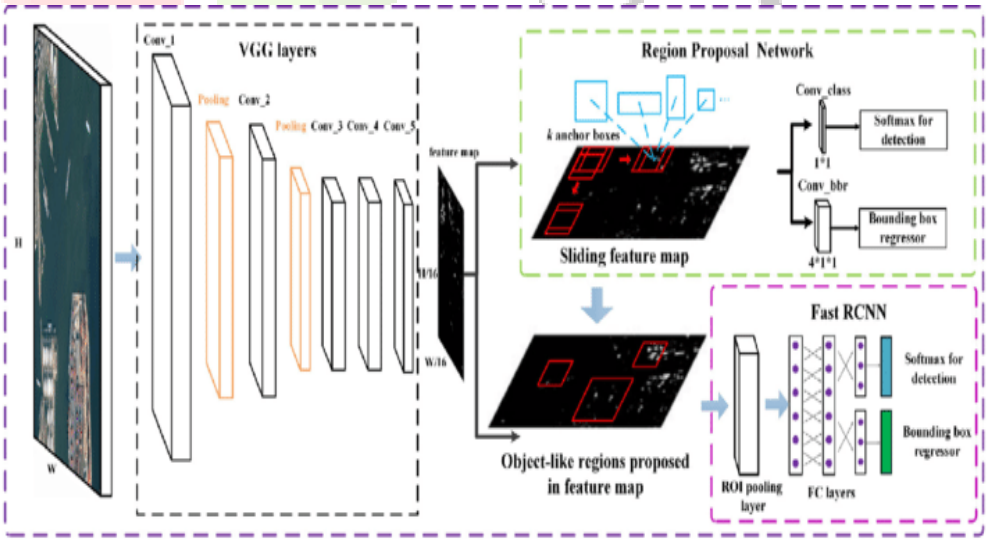

Figure 5: Architecture of Fast R-CNN

IV. OBJECTIVES

- To Identify the person on video wearing face mask with the help of camera and machine learning algorithm by using the python lib.
- We developed a face mask wearing condition identification method. We are ready to classify two categories of face mask wearing.
- Promoting the usage of face masks with the use of effective technology to identify the face mask will help to prevent the spread of the Corona virus.
- Assist in taking appropriate preparations for society's safety by forecasting future COVID-19 outbreaks.

V. METHODOLOGY

5.1.TOOLS AND TECHNOLOGIES USED:

1. **Anaconda:** Anaconda is a Python and R programming language distribution aimed for simplifying package management and deployment in scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, and so on).

2. **Computer Vision:** It is a field that involves processing, interpreting, and comprehending high-dimensional data from the actual world in order to generate numeric and symb0lic.

3. **TensorFlow:** A software library and framework for neural network and machine learning applications that is open-source. Tensor Flow is a high-level API-based mathematical computing framework for training and creating machine learning models.

4. **OpenCV:** It's used for real-time computer vision applications.

5. **Keras:** Keras is a programming interface for neural networks. It's a Python library designed exclusively for that purpose. It too coordinating with other libraries and modules, such as tensor stream to create machine learning more open.

5.2. SYSTEM FLOW ARCHITECTURE:

The input image from the dataset was used to create our proposed system design. There are two primary stages to it. A Face Detector is included in the initial stage of our design, which locates several faces in photos of various sizes and finds faces even in overlapping instances. The retrieved faces from this stage are then batched together and delivered to our architecture's second stage, a CNN-based Face Mask Classifier. The second stage's results are decoded, and the ultimate output is an image with all of the faces accurately identified and classified as masked or unmasked faces.

The Flow of Execution of our project is as shown in fig 6.

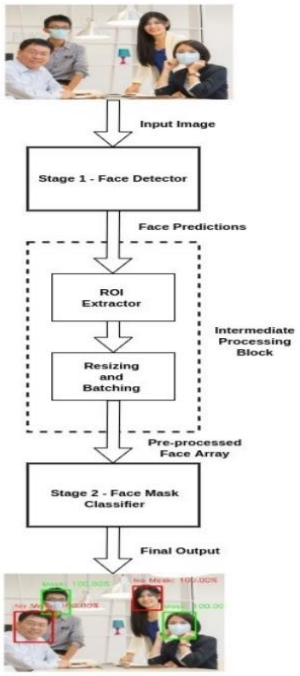

Figure 6 : System Flow Architecture

5.3. IMPLEMENTATION:

Method:
1. Train Data learning model.
2. Apply facemask detector over live video stream.

Step 1. Data Visualization or collecting data

formation Visualization or collecting information In this to begin with step, let us visualize the entire number of pictures within the dataset in these two categories. We can see that there are 1800 images in the "yes" category and 1800 images in the "no" category detections and pass the class in the speech synthesizer in order to generate the audio voice alert to assist the visually impaired.

Step 2. Providing more data

In the next step, we expand the data set to include a larger number of images for training. In this step of data expansion, we rotate and flip each image in the dataset.

Step 3. Training the CNN model

This is main step in which we put images in to training set to use the sequence model build by the keras library. We will train the model for 10 epoch. By training the model with more epoch to get higher accuracy.

Step 4. Taking input from camera

We will take image input from video sequence with the help of inbuilt laptop camera.

Step 5. Face detection with mask detection algorithm

With the help of Haar Cascades to detect objects from the image and CNN (Convolutional Neural Network) face mask detection .

VI. RESULTS:

The sample output showing detected objects with bounding boxes, respective labels are shown in figure 7 & 8. These images have been shows person with mask and without wearing a mask.

Figure 7. With Mask

Figure 8. Without Mask

VII. CONCLUSION

One The model will tested with image and real time video stream. The accuracy of the model will achieve above 90% and the optimization of the model continuous process. This method will be effective in monitoring the use of face masks at workplaces in this pandemic crisis, where the entire world wishes to return to normal routine. We can detect a mask on someone's face and enable them to enter the workplace thanks to the creation of this system. This approach also contributes to public healthcare by assisting in the preservation of the environment. This framework can be utilized in open areas with inserted innovation to guarantee that open security prerequisites are taken after in air terminals, prepare stations, workplaces, schools, and public

VIII. REFERENCES

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