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Realtime Face mask Detector using YoloV4

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Abstract - With the tremendous outbreak and the spread of Covid-19, the need of the people to follow certain protocols and practices and to wear a mask in crowded places is increasing. According to the World Health Organization, in order to follow protocols such as to maintain a distance from one another of at least 3 feet or 1 meter is necessary. This proposed methodology focuses on a solution to help wearing a mask properly in public using YOLO object detection algorithm in videos, photos and embedded camera infrastructure in real time. The test results shown in this project state that the procurement of covered faces of people based on YOLO-V4 has a stronger firmness and faster recovery speed compared to other competitors. Our proposed object acquisition model achieved an average accuracy of 94.75% points with a maximum resolution of 38 FPS in video. The network ensures a speed of thinking that is able to deliver real-time results without compromising accuracy, even in complex systems. The proposed classification approach also produces promising results in a number of dynamic context.

***Key Words*: YOLO-V4, accuracy, realtime, Fps, face mask.**

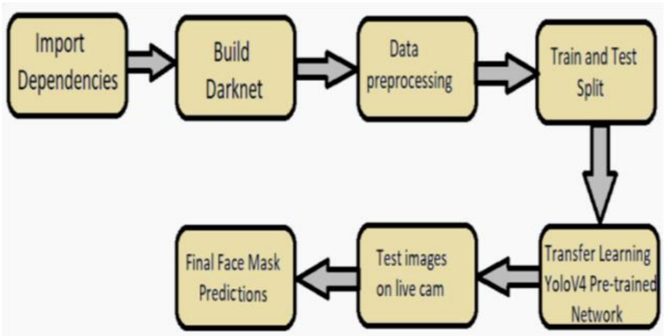
1. INTRODUCTION

Since the COVID-19 pandemic affected the world, serious protocols and necessary steps were implemented by governments around the world to control its rapid outbreak. This has led to the effects on day-to-day running of the daily routine. Relevant authorities like WHO have assigned down certain guidelines and protocols to minimize people's exposure to the virus. In some safety measures people are encouraged to follow wearing a mask and keeping a distance of 3 ft, which is about 1m, from another person. There are a number of countries in the world that have made the wearing of masks mandatory by law, and it has been shown that certain NGOs in other countries have also followed their path. In many institutions, it is difficult to ensure that people are following these important social segregation rules. To allow for easy tracking for such violators, the need of a tracking system is a complete hour requirement.

2. LITERATURE SURVEY

The method mainly comprise of varying angles and lack of clarity. Indistinct moving faces in the video stream make it more difficult [1]. Due to the limited masked face dataset, it become more complex to learn better features about the masked face detector. For better accuracy and better performance need a much larger dataset [2]. The developed system faces difficulties in classifying faces covered by hands since it almost looks like the person wearing a mask. While any person without a face mask is traveling on any vehicle, the system cannot locate that person correctly. For a very densely populated area, distinguishing the face of each person is very difficult. For this type of scenario, identifying people without face mask would be very difficult for the proposed system.[5]. Data augmentation is used for the proposed work that allows practitioners to increase dramatically the data available for training models without actually collecting new data, so a small dataset has been used.[3]. This piece of research mainly focus on building a custom object detection model using YOLOv3 not to make the whole architecture. And the dataset that they collected is not that much variety.[4]. The limitation observed here is that the threshold range is set in pixels between (90, 170), which means there is no scope for calibration depending on positioning of camera.[6]

3. PROPOSED SOLUTION



To reduce the spread of virus and also remind people to be healthy. To optimise this problem in calculating number if people with mask or without mask, we are using Yolov4 model to speedup in producing results. Our solution is providing fast accuracy and all is done in real time.

Environment: In order to implement this project, use Google Colab's resources. The first experimentations of the preprocessing steps were built on my laptop since they were not computationally expensive, but the model got trained on Colab using GPU. On Colab->Edit->Notebook Settings someone can activate GPU On Colab via Edit->Notebook Settings someone can activate GPU .

Dataset: First things first, in order to build a mask detector we need relevant data. Additionally, because of the nature of YOLO, we need annotated data with bounding boxes. One option is to build our own dataset by gathering images either from the web or by taking pictures of friends/acquaintances and annotate them by hand using specific programs such as LabelImg. However, both ideas would be exceptionally tedious and time-consuming (especially the latter). The other option, which is the most viable by far for my purpose, is to use a publically available dataset. The downloaded dataset consists of two folders: Images, which comprises .png files Annotations, which comprises corresponding .xml annotations. After we download the dataset, we need to convert the .xml files into .txt and, more precisely, we need to create the YOLO format in order to train our model. To create a .txt file we need 5 things from each .xml file. For each in an .xml file fetch the class (namely the ... field), and the coordinates of the bounding box (namely the 4 attributes in ...). However, to achieve that I created a script that fetches the a forementioned 5 attributes for each object in each .xml file and creates the corresponding .txt files.

Train-Test Split: In order to train our model and validate it during the training phase, we have to split our data into two sets, the training, and the validation set. The proportion was 90– 10% respectively. So I created two new folders and I put 86 images with their corresponding annotations into the test_folder and the rest 767 images into the train_folder.

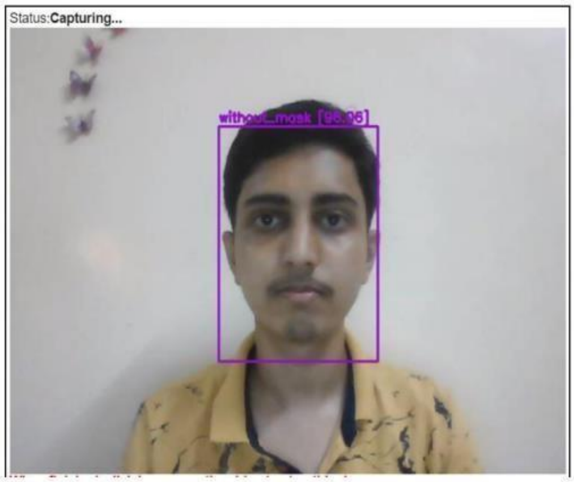
Clone the darknet framework: The next step is to clone the darknet repo and after that, we need to download the weights of the pretrained model in order to apply transfer learning and not train the model from scratch. Darknet53.conv.74 is the backbone of the YOLOv4 network which is originally trained for classification on the ImageNet dataset and plays the role of the extractor. To use this for detection the additional weights which are present in the YOLOv4 network are randomly initialized prior to training. But of course, they are going to get their proper values during the training phase.

With the help of Opencv and output camera we are able to detect if a person is wearing facemask or not.

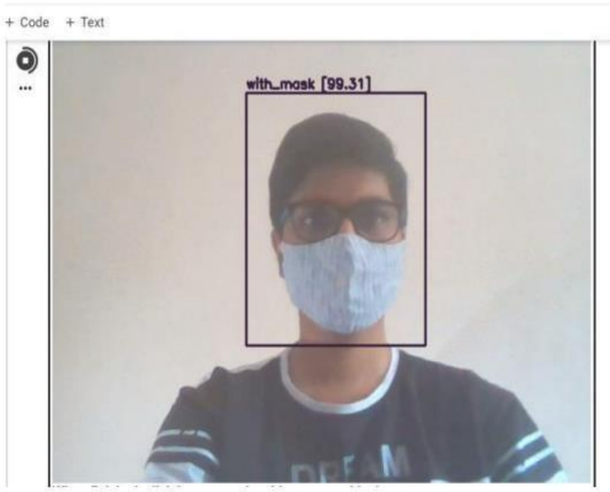
4. RESULT ANALYSIS

Realtime Facemask detection using Yolov4 , Darknet, OpenCV and basic python libraries. Face masks have been recognized with more than 95% test accuracy. This can be alsofurther extended by adding more datasets. We have cloned the darknet repository and then trained the dataset for effective classification.

- Single person without mask

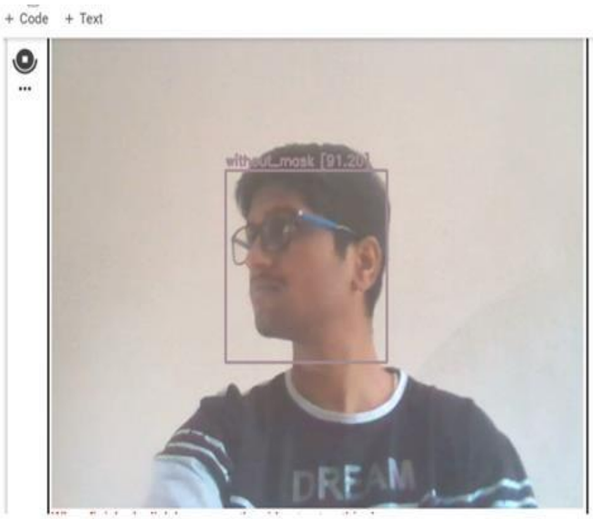


- Single person with mask



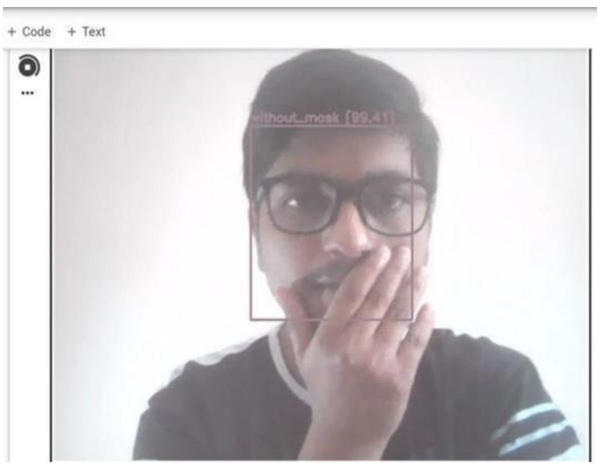
- Multiple people without mask

- Single person without mask side looking in different direction resulted in without mask



- Multiple people with mask

- Single person face covered with hand resulted in without mask



5. FUTURE SCOPE

If our model becomes successful and also always produces output in real time and instantly we will definitely add more features like gender distinguisting, image capturing of not ware person, provide better user experience and lot more.

3. CONCLUSION

In our study, we introduced the finding method, if a person wears a mask or does not use a mask that uses YOLOv4 architecture. Works great in real-time and results have been quite positive. Its acquisition function with two classes mask / no mask. In real-time this model gives impressive output when the fps rate is more than 30. This research focuses on creating a custom detector, a model that uses YOLOv4. Although the data we have collected is not very different after all it gives us promising accuracy in testing with others real world data. This light weight the model is easy to measure and can be used effectively in real time due to the high FPS and good accuracy.

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