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Title **COVID-19 Prevention Using an Automated Non-Pharmaceutical Intervention Detection System**

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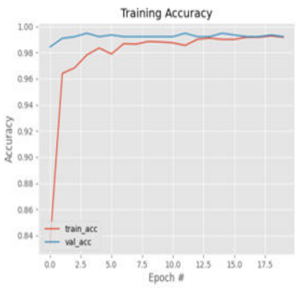

Fig.5 Accuracy achieved in training

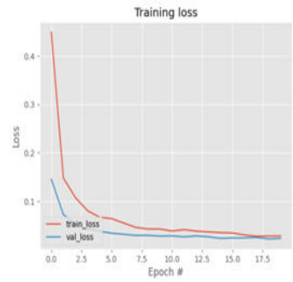

Fig.6 Loss sustained in training

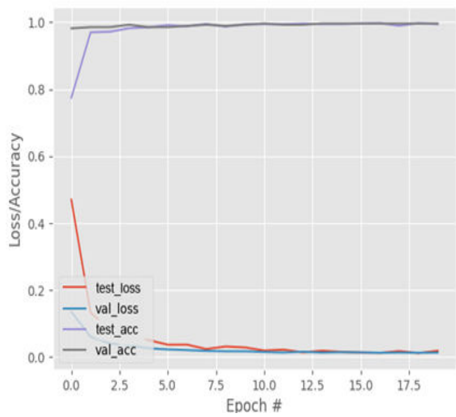

Fig. 7 Accuracy and loss of the developed system for testing phase

Fig. 8 depicts the receiver operating characteristic (ROC) curve of the proposed framework. This illustrates the prediction ability of the classifier at different thresholds. Two parameters are plotted in the ROC curve; one is the true positive rate (TPR) and the other is the false positive rate (FPR) measured using (1) and (2) respectively. TPR and FPR are calculated for different thresholds and these values are plotted as ROC curves. The area under the ROC curve (AUC) measures the performance of the binary classifier for all possible thresholds. The value of AUC ranges from 0 to 1. When

a model predicts 100% correct its AUC is 1 and when it predicts 100% wrong then its AUC is 0. The AUC achieved from our classifier is 0.985 that points towards a decent classifier.

$$True\ Positive\ Rate = \frac{True\ Positive}{True\ Positive + False\ Negative} \quad (1)$$

$$False\ Positive\ Rate = \frac{False\ Positive}{True\ Negative + False\ Positive} \quad (2)$$

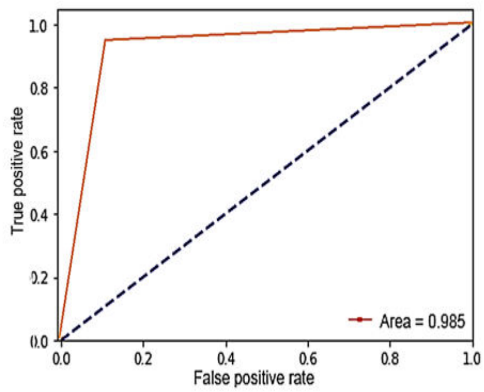

Fig.8 ROC of the classification network.

V. CONCLUSION

The developed architecture is capable of imposing and strictly monitoring any violations COVID-19 primary safety precautions, which are wearing a face mask along with maintaining social distance, our automated system detects any person in the vicinity and then detects their face to classify whether the person is wearing mask or not, simultaneously the social distance detector which based on YOLOv3 object detection, detects people and computes the distance among them, if its less than the advised distance its counted under violation. The accuracy of the model is 98.8%, the model presented in this paper can act as an asset to impose and monitor the primary safety precautions. The inspiration for this work comes from the efforts of frontline workers and scenarios they face while trying to impose these rules, they get exposed to crowd and there is always a risk of getting infected.

VI. LIMITATIONS AND FUTURE SCOPE

As no system can provide 100% efficiency, or there is no system without errors or exception with that said, similarly our proposed system has few drawbacks it sometimes classifies people with non-regular grooming as with mask. The system might not detect every face in overcrowded places, as whole architecture is based on computer vision therefore it requires high quality cameras for better results. System requires a standard set of hardware requirement; additional GPU will work smoothly and reduces the processing time. Furthermore, the system can be integrated with smart city network for location tracking and pushing alert notification to the concerned authorities of the locality, facial recognition module can enhance the identification of the violators and providing the authorities a above hand on the situation, use of drones and robots can ensure zero contact and guarantee safety, that would be another study for future.

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