

## Using Machine Learning to Build a Real-Time COVID-19 Mask Safety Monitor

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**Abstract :** The US Center for Disease Control has recommended wearing masks to slow the spread of the virus. The research uses a video feed from a camera to conduct real-time classifications of whether or not a human is correctly wearing a mask, incorrectly wearing a mask, or not wearing a mask at all. Utilizing two distinct datasets from the open-source website Kaggle, a mask detection network had been trained. The first dataset that was used to train the model was titled 'Face Mask Detection' on Kaggle, where the dataset was retrieved from and the second dataset was titled 'Face Mask Dataset, which provided the data in a (YOLO Format)' so that the TinyYoloV3 model could be trained. Based on the data from Kaggle, two machine learning models were implemented and trained: a Tiny YoloV3 Real-time model and a two-stage neural network classifier. The two-stage neural network classifier had a first step of identifying distinct faces within the image, and the second step was a classifier to detect the state of the mask on the face and whether it was worn correctly, incorrectly, or no mask at all. The TinyYoloV3 was used for the live feed as well as for a comparison standpoint against the previous two-stage classifier and was trained using the darknet neural network framework. The two-stage classifier attained a mean average precision (MAP) of 80%, while the model trained using TinyYoloV3 real-time detection had a mean average precision (MAP) of 59%. Overall, both models were able to correctly classify stages/scenarios of no mask, mask, and incorrectly worn masks.

**Keywords :** datasets, classifier, mask-detection, real-time, TinyYoloV3, two-stage neural network classifier

**Conference Title :** ICAMLT 2021 : International Conference on Advances in Machine Learning Technologies

**Conference Location :** Paris, France

**Conference Dates :** June 24-25, 2021