Chapter 16
A Novel Approach for Detecting Face Masks and Social Distancing in Public Places

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ABSTRACT

The system is fed with the CCTV footage or a real-time web camera, where the people in the frame get detected and the face mask detection module takes place. It uses the facial recognition and identifies a person without mask, followed by a notification alert message through a mail. Then the social distancing module checks whether the person is in a safe zone by measuring social distancing with nearby people. It alerts as "Please put on the mask. The people near you are not following social distancing." The CCTV cameras are set-up in places where the system needs to follow the above violation metrics. Extra CCTV cameras can be installed if certain areas are meant to be monitored where CCTV cameras were not previously installed. Then the servers or computers must be installed to run inference of the received footage. The system uses a deep learning model in the computer servers to identify the above specified violation metrics.

DOI: 10.4018/978-1-6684-5741-2.ch016

INTRODUCTION

The global spread of new coronavirus illness has created a critical health issue. Because of the Covid-19 pandemic, the entire globe has come to a halt. The disease spread is accelerating and has thrown the entire world's stability into disarray. On other one, the pharmaceutical sector is working hard to develop a perfect vaccine, while medical professionals are working hard to reduce the fatality rate.

Prevention is always the best option in any case, social distance and masking has (Rahman et al., 2020) become a top focus. According to research, the Covid-19 virus is disseminated by two basic methods: the first is through droplets ejected by a carrier, which travel through the air until gravity draws them down. Because the maximum distance of that flight is roughly 6 feet, social distancing is critical.

Masks act as a barrier against droplets, protecting both the wearer and those around them. People who do not use masks (Uddin et al., 2020; Yadav, 2020) and go outside increase the danger of infection and become irresponsible citizens. Aerosol particles, roughly 1/100th the size of a human hair, are more difficult to protect against in humans. The corrective remedy for this type of transmission will be social separation and remaining outside, where there is more air flow.

According to scientific studies, roughly 30% of infections are generated by persons (Kovalenko & Surudzhii, 2014; Krishna & Harshita, 2021; Loey et al., 2021) who are unaware they have COVID-19(Nagrath et al., 2021) because they are asymptomatic. Wearing masks reduces the danger of spreading the infection by 65 percent and social separation reduces it by 90 percent.

Following social distancing and wearing mask inside educational campuses is critical right now. Artificial intelligence (AI), machine learning (Guo et al., 2018), and image recognition technologies all can be used to enforce social distancing norms and detect infractions of obligatory face masks on campus. Authorities can simply monitor the large campus using this technology and ensure the safety and security of the kids on a regular basis. In MNCs, the same rules apply. This can ensure both social distancing and face mask violations not been mad and control over the particular place is ensured.

BACKGROUND STUDY

This work in (Jiang et al., 2020) proposes a two-stage CNN (Chavda et al., 2021) architecture, with the first stage recognizing human faces and the second stage employing a lightweight image classifier to classify the faces detected in the first stage as 'Mask' or 'No Mask' faces and draw bounding boxes around them with the observed class name. The face detector extracts all of the faces in the image and outputs them (Ao et al., 2009) together with their bounding box coordinates.

ResNet is the normal backbone in RetinaFaceMask (Punn et al., 2020), but MobileNet is offered for comparison and to reduce computation and model size in deployment circumstances with restricted computer resources. FPN is used as a neck in RetinaFaceMask, and It may extract high-level semantic information and then utilise an addition operation with a coefficient to merge it into the feature maps of previous layers. Because it can have varied receptive fields to detect varying sizes of objects, RetinaFaceMask uses a multi-scale detection technique similar to SSD to create a prediction with several FPN feature maps.

To differentiate persons from the backdrop, the proposed (Ansor et al., 2020) system uses the YOLO v3 object detection model, as well as the Deepsort technique to track recognized people using bounding boxes and issued IDs. The results of the YOLO v3 model are compared to those of other popular