# Abstract

The new Coronavirus disease (COVID-19) has seriously affected the world. By the endof November 2020, the global number of new coronavirus cases had already exceeded 60 millionand the number of deaths 1,410,378 according to information from the World Health Organization(WHO). To limit the spread of the disease, mandatory face-mask rules are now becoming common inpublic settings around the world. Additionally, many public service providers require customersto wear face-masks in accordance with predefined rules (e.g., covering both mouth and nose) whenusing public services. These developments inspired research into automatic (computer-vision-based)techniques for facemask detection that can help monitor public behavior and contribute towardsconstraining the COVID-19 pandemic. Although existing research in this area resulted in efficienttechniques for face-mask detection, these usually operate under the assumption that modern facedetectors provide perfect detection performance (even for masked faces) and that the main goal ofthe techniques is to detect the presence of face-masks only. In this study, we revisit these commonassumptions and explore the following research questions:(i) How well do existing face detectorsperform with masked-face images? (ii) Is it possible to detect a proper (regulation-compliant)placement of facial masks? and iii) How useful are existing face-mask detection techniques for monitoring applications during the COVID-19 pandemic? To answer these and related questionswe conduct a comprehensive experimental evaluation of several recent face detectors for theirperformance with masked-face images. Furthermore, we investigate the usefulness of multipleoff-the-shelf deep-learning models for recognizing correct face-mask placement. Finally, we designa complete pipeline for recognizing whether face-masks are worn correctly or not and comparethe performance of the pipeline with standard face-mask detection models from the literature. Tofacilitate the study, we compile a large dataset of facial images from the publicly available MAFA andWider Face datasets and annotate it with compliant and non-compliant labels. The annotation dataset,called Face-MaskLabel Dataset (FMLD), is made publicly available to the research community.

**1.1 Introduction :**

According to the World Health Organization (WHO)’s official Situation Report, coronavirus disease 2019 (COVID-19) has globally infected over 20 million people causing over 0.7 million deaths. Individuals with COVID-19 have had a wide scope of symptoms reported – going from mellow manifestations to serious illness. Respiratory problems like shortness of breath or difficulty in breathing is one of them. Elder people having lung disease can possess serious complications from COVID-19 illness as they appear to be at higher risk. Some common human coronaviruses that infect public around the world are 229E, HKU1, OC43, and NL63. Before debilitating individuals, viruses like 2019-nCoV, SARS-CoV, and MERSCoV infect animals and evolve to human coronaviruses. Persons having respiratory problems can expose anyone (who is in close contact with them) to infective beads. Surroundings of a tainted individual can cause contact transmission as droplets carrying virus may withal arrive on his adjacent surfaces.

To curb certain respiratory viral ailments, including COVID-19, wearing a clinical mask is very necessary. The public should be aware of whether to put on the mask for source control or aversion of COVID-19. Potential points of interest of the utilization of masks lie in reducing vulnerability of risk from a noxious individual during the "pre-symptomatic" period and stigmatization of discrete persons putting on masks to restraint the spread of virus. WHO stresses on prioritizing medical masks and respirators for health care assistants. Therefore, face mask detection has become a crucial task in present global society.

Face mask detection involves in detecting the location of the face and then determining whether it has a mask on it or not. The issue is proximately cognate to general object detection to detect the classes of objects. Face identification categorically deals with distinguishing a specific group of entities i.e. Face. It has numerous applications, such as autonomous driving, education, surveillance, and so on. This paper presents a simplified approach to serve the above purpose using the basic Machine Learning (ML) packages such as OpenCV and Scikit-Learn.

**Existing System:**

COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society. This paper presents a simplified approach to achieve this purpose using some basic Machine Learning packages like OpenCV and Scikit-Learn. The proposed method detects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion. The method attains accuracy up to 95.77% and 94.58% respectively on two different datasets. We explore optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

**Proposed system:**

In face detection method, a face is detected from an image that has several attributes in it. According to, research into face detection requires expression recognition, face tracking, and pose estimation. Given a solitary image, the challenge is to identify the face from the picture. Face detection is a difficult errand because the faces change in size, shape, colour, etc and they are not immutable. It becomes a laborious job for opaque image impeded by some other thing not confronting camera, and so forth. Authors in think occlusive face detection comes with two major challenges: 1) unavailability of sizably voluminous datasets containing both masked and unmasked faces, and 2) exclusion of facial expression in the covered area. Algorithm and the dictionaries trained on an immensely colossal pool of masked faces, synthesized mundane faces, several mislaid expressions can be recuperated and the ascendancy of facial cues can be mitigated to great extent. According to the work reported in, convolutional neural network (CNNs) in computer vision comes with a strict constraint regarding the size of the input image. The prevalent practice reconfigures the images before fitting them into the network to surmount the inhibition.

Here the main challenge of the task is to detect the face from the image correctly and then identify if it has a mask on it or not. In order to perform surveillance tasks, the proposed method should also detect a face along with a mask in motion.

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