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An automated face mask detection system using transfer learning based neural network to preventing viral infection

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Abstract

As the "Internet of Medical Things (IoMT)" grows, healthcare systems can collect and process data. It is also challenging to study public health prevention requirements. Virus transmission can be prevented by wearing a mask. The World Health Organization (WHO) recommends wearing a facemask to protect against the COVID-19 pandemic—the levels of a pandemic rise across almost all regions of the world. By following the WHO rules, we support the development of face mask-detecting technologies and determine whether or not people are using masks in public locations. The proposed paradigm in this paper will work in three stages. Firstly, we use an Image data generator to import the images. In addition to using a Haar cascade (HC) classifier for detecting faces, residual learning (ResNet152V2) trains a model that detects whether someone is wearing a face mask. Detection and classification are carried out in real-time with high precision. Compared with other recently proposed methods, the model achieved 99.65% accuracy during training and 99.63% during validation.

KEYWORDS
classification, face mask detection, Haar Cascade (HC) classifier, neural network, ResNet152V2, transfer learning

1 | INTRODUCTION

Coronaviruses are a vast virus family that can cause various disorders, such as cold or Extreme Acute Respiratory Syndrome (EARS), Middle East Respiratory Syndrome (MERS), and more serious respiratory infections. In Wuhan, China, coronavirus (COVID-19) (Vinh & Anh, 2020) was discovered in 2019. Many people are affected by COVID-19, including their health, mental health, finances, etc. Every day, we face new symptoms or mutations of COVID-19 (Madaan et al., 2021), so it is becoming complicated to identify or filter it. So prevention is critical to protect our and others' lives. It is possible to identify a person with or without a mask using face mask detection (Wu et al., 2022). A reverse engineering face detection algorithm keeps surveillance, authentication, and security by recognizing a face using some machine learning algorithm. IoT has made data analysis, collection, and sense easier (Sethi et al., 2021). With the Internet of Things (Naseri et al., 2023), working and daily routines can undergo revolutionary changes. Smart sensors are used to monitor patients' health through IoMT, an application of IoT in medical applications.

Facemasks must be worn in public locations such as factories, departments, and working offices during the COVID-19 pandemic (Vinh & Anh, 2020). Facemasks should be worn to prevent the transmission of COVID-19 and infection from sick people. So wearing a facemask is essential to reduce the risk of contamination. As per the World health organization (WHO), people should wear a facemask and maintain social distancing (Ahmed et al., 2021) to reduce the risk. Technology such as artificial intelligence (AI) and machine learning (ML) is crucial in preventing the