**Crowd Social Distance And Mask Detection using Classical Machine Learning**

**(**Project Report**)**

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***Abstract***

As the COVID-19 pandemic continues to pose a threat to public health and safety, there is an urgent need for innovative solutions to mitigate the spread of the virus. In this paper, we present a computer vision-based system for detecting social distancing violations and mask-wearing compliance in crowded public spaces. The system uses a combination of deep learning algorithms and image processing techniques to analyse camera feeds and identify violations in real-time.

We describe the architecture of the system, which includes a camera network, edge devices for image processing and analysis, and a central server for data management and reporting. We also evaluate the accuracy and efficiency of the system using a dataset of simulated crowd scenarios and real-world tests in public spaces.

*Keywords— COVID-19, Masked face, Deep learning,*

*Classical machine learning*

# INTRODUCTION

The emergence and rapid global spread of a new strain of coronavirus known as SARS-CoV-2 originated in Wuhan, China, and was officially declared a worldwide pandemic by the World Health Organization (WHO). This led to the development of the coronavirus disease (COVID-19). Since its onset, COVID-19 has been responsible for a staggering number of cases, with a recorded total of 220,563,227 positive cases and 4,565,483 deaths worldwide. While the introduction of vaccines initially brought some reassurance to populations worldwide, reports of COVID-19 infections among vaccinated individuals raised concerns and highlighted the importance of adhering to recommended measures, such as following WHO's standard operating procedures (SOPs) which include wearing face masks and practising social distancing. It is worth noting that prior to this outbreak, face masks were commonly used as a preventive measure against air pollution, as paramedical workers in hospitals or to conceal their identities when committing crimes, etc. However, during the pandemic, everyone must wear a face mask in public places to stop COVID-19 from spreading. Although COVID-19 cases have come down now as of 2023 and people do not have much concern regarding it, it can still spread if precautions are not taken. Controlling COVID-19 distribution is currently a major concern for WHO policymakers and all of humanity. Wearing a face mask lowers the spread of COVID-19 by lowering the likelihood of respiratory (virus-laden) droplets being transmitted, according to most of the evidence from the WHO, analysis and study. Consequently, numerous countries have implemented mandatory face mask requirements in public settings as a preventive measure to halt the transmission of COVID19.It is challenging to manually check people in public places for face masks. Therefore, it is necessary to develop automated techniques for spotting face masks. To prevent the COVID-19 virus from spreading quickly throughout a community, governments must require people to wear face masks. However, wearing a face mask also poses additional problems for face recognition software that is generally made for faces that are not covered up. These facial recognition programs, which have been implemented at several checkpoints, function less well when masked faces are present because important facial features like the nose, lips, chin, cheeks, and so on are lost.

# RESULTS AND DISCUSSION

In this study, we trained a classical machine learning model to detect social distance violations and mask wearing in crowds. We used a dataset of 1376 images of people with and without masks. We trained the crowd social distancing model on Pascal VOC dataset 2012.

The model was trained using deep learning with hyperparameters tuned using grid search. We evaluated the performance of the model using accuracy, precision, recall, F1-score, confusion matrix, and classification report