An Optimized Machine Learning and Deep Learning Framework for Facial and Masked Facial Recognition

ABSTRACT

In this study, we aimed to find an optimized approach to improving facial and masked facial recognition using machine learning and deep learning techniques. Prior studies only used a single machine learning model for classification and did not report optimal parameter values. In contrast, we utilized a grid search with hyperparameter tuning and nested cross-validation to achieve better results during the verification phase. We performed experiments on a large dataset of facial images with and without masks. Our findings showed that the SVM model with hyperparameter tuning had the highest accuracy compared to other models, achieving a recognition accuracy of 0.99912. The precision values for recognition without masks and with masks were 0.99925 and 0.98417, respectively. We tested our approach in real-life scenarios and found that it accurately identified masked individuals through facial recognition. Furthermore, our study stands out from others as it incorporates hyperparameter tuning and nested cross-validation during the verification phase to enhance the model's performance, generalization, and robustness while optimizing data utilization. Our optimized approach has potential implications for improving security systems in various domains, including public safety and healthcare.