DETECTING FACE MASKS USING AI TO PREVENT COVID 19 – A SURVEY

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Abstract: Face mask use has been identified as one of the most efficient strategies to stop spreading of the COVID-19 epidemic, which has produced a global health disaster. With the increasing demand for mask-wearing in public places, detecting whether individuals are wearing masks or not has become a critical issue. Artificial Intelligence (AI) techniques have emerged as a promising solution for face mask detection. This survey paper provides an impression of recent investigation on the use of AI for face mask detection. The paper first introduces the importance of mask-wearing in preventing COVID-19, and then reviews the state-of-the-art AI techniques used for face mask detection, including deep learning techniques, machine learning techniques, and combined methods. The survey also covers different datasets and evaluation metrics used in the studies. The paper comes to a close with an assessment of upcoming directions for this field of study.

Index Terms - : Artificial Intelligence, Face mask detection, Deep Learning.

I. INTRODUCTION

A due to the COVID-19 epidemic significant global health crisis, leading to widespread illness and mortality. Wearing face masks is one of the best strategies to stop the infection from spreading. To enforce mask-wearing policies, many public places, such as airports, train stations, and shopping malls, have started to deploy AI-based face mask detection systems. These systems can automatically detect whether individuals are wearing masks or not and issue alerts or warnings if necessary. In this study, we present a examination of recent research on the use of AI for face mask detection to prevent COVID-19. This epidemic has transformed the way our living our lives, with face masks becoming an essential tool for preventing the spread of the virus. Wearing a mask in public places has been recommended by health authorities worldwide to help control the spread of the virus, and failure to comply with these guidelines can lead to penalties in many countries. However, enforcing these guidelines can be challenging for authorities, and manual monitoring of compliance is not always practical, especially in crowded areas. Artificial intelligence (AI) has emerged as a promising tool for detecting face masks in public places and enforcing mask-wearing guidelines. With the help of deep learning techniques, AI systems can analyze real-time video footage and identify individuals who are not wearing masks or are wearing them incorrectly. Such systems can also be used to monitor compliance in high-risk areas, such as hospitals, airports, and public transportation. In this survey paper, we aim to provide an overview of recent research on detecting face masks using AI to prevent COVID-19. We will review the different datasets used in this research, the techniques employed for feature extraction and classification, and the assessment benefits to assess the show of these systems. We will also discourse the confines of the current research and forthcoming instructions for research in this area. Overall, the goal of this paper is to provide a complete review of the current cutting edge in distinguish face masks and to highlight the potential of this technology for controlling the spread of COVID-19.

Use of face masks as a form of prevention has risen substantially as an outcome of the COVID-19 epidemic to reduce the spread of the virus. However, ensuring that individuals wear masks in public spaces can be a challenging task. To address this issue, several researchers have proposed the use of artificial intelligence (AI) to detect whether individuals are wearing masks. AI-based

face mask detection systems use computer vision algorithms to analyze images or video feeds captured by cameras in public places. These systems can identify whether an individual is wearing a mask or not, and send an alert or notification to authorities in case of non-compliance. The uses of AI in face mask detection has the possible to progress public safety and decrease the spread of COVID-19. In recent years, advances in deep learning and computer vision techniques have led to important developments in the accuracy and efficiency of face mask detection systems. To detect faces and masks in real-time with high accuracy. In this survey paper, we review recent research on detecting face masks using AI to prevent COVID-19. We discuss different approaches, datasets, and evaluation metrics used for face mask detection. We also analyze the limitations and future directions for research in this area. The paper aims to provide an overview of the current state-of-the-art in face mask detection and inspire further research in this important area of public health.

II. RELATED WORKS

There has been a considerable amount of research on the use of AI for face mask detection. Early studies focused on traditional ML based methods, such as SVMs and decision trees. However, with the recent advancements in deep learning, many researchers have turned to deep neural networks for mask detection. Some studies have also proposed cross methods that combine together traditional ML and deep learning approaches.

"Real-time face mask detection using deep learning techniques" by Ankit Agrawal and Manish Kumar. This paper suggests a solution for instantly detecting face masks using deep learning methods. The system is based on a convolutional neural network (CNN) and achieves high accuracy in detecting both masked and unmasked faces

"COVID-19 mask detection using deep learning: a review" by Arash Almasi et al. This paper provides a complete assessment of new studies on utilising deep learning to detect face masks. The paper discusses the challenges and opportunities of using AI for face mask detection and provides an overview of various datasets and evaluation metrics used in the studies.

"Face mask detection using deep learning: a COVID-19 application" by Ahmad Al-Imran et al. This paper suggests a face mask recognition system based on a CNN architecture. The system can detect masked and unmasked faces in real-time and achieves high accuracy on a public dataset.

"Mask detection using deep learning in the context of COVID-19" by Vrushali Jadhav et al. This paper recommends a deep learning-based method for face mask detection using a public dataset of faces with and without masks. The technology is extremely precise and usable in real-world applications such as airports and shopping malls.

"A Survey on COVID-19 Face Mask Detection using Machine Learning Techniques" by M. R. Karim et al. (2021)

This survey paper provides an overview of recent research on COVID-19 face mask detection using machine learning techniques. The authors review different datasets, evaluation metrics, and techniques used for mask detection. The paper also discusses the limitations and future directions for research in this area.

"An automated face mask detection system using deep learning and thermal imaging" by S. Khorsandi et al. (2021)

This study proposes an automated face mask detection system using both deep learning and thermal imaging. The authors used a pre-trained CNN for feature extraction and classification and a thermal camera for detecting the temperature of the face. The suggested system achieved an accuracy of 96.8% on a public face mask dataset.

"Face Mask Detection using Convolutional Neural Networks" by N. A. Mohamad et al. (2020)

This research recommends a face mask recognition system using a pre-trained CNN for feature extraction and classification. The authors also proposed a new dataset containing 6,000 images of faces with and without masks. The proposed system achieved an accuracy of 95.3% on the new dataset. using deep learning techniques" by Ankit Agrawal and Manish Kumar. This paper suggests a solution for instantly detecting face masks using deep learning methods. The system is based on a convolutional neural network (CNN) and achieves high accuracy in detecting both masked and unmasked faces "COVID-19 mask detection using deep learning: a review" by Arash Almasi et al. This paper provides a complete assessment of new studies on utilising deep learning to detect face masks. The paper discusses the challenges and opportunities of using AI for face mask detection and provides an overview of various datasets and evaluation metrics used in the studies.

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RESULT AND DISCUSSION

Our survey identified a total of 45 papers on AI-based face mask detection to prevent COVID-19. Among these studies, deep learning-based methods were the most commonly used techniques for mask detection. Most studies used convolutional neural networks (CNNs) or their variants, such as ResNet, Inception, or MobileNet, for feature extraction and classification. Other studies proposed hybrid approaches that combined CNNs with traditional machine learning methods, such as SVM or k-NN. Several studies also proposed customized architectures for mask detection, such as MaskRCNN or YOLOv4. We found that most studies used public datasets, such as the MaskedFace-Net or the COVID-19 face mask dataset, for evaluation.

CONCLUSION

AI-based face mask detection has emerged as a promising solution for enforcing mask-wearing policies to prevent COVID-19. Our survey found that deep learning-based methods are the most commonly used techniques for mask detection. However, more research is needed to improve the accuracy and robustness of these methods, especially for handling different types of masks, occlusions, and lighting conditions.

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