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Masked Face for Secure Authentication

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ABSTRACT

To protect ourselves from infectious diseases brought on by viruses, we must now wear masks. The COVID-19 virus has caused a pandemic crisis for mankind now. It makes life worse for all living creatures, especially humans. The entire world seemed to be stuck in its routine. Due to the lack of direct lessons, the educational institutions are most impacted by this pandemic situation. They are willing to conduct classes under certain conditions, such as social distance, mask wear, and hand sanitization, in order to prevent this scenario. We have decided that wearing a mask is more significant than the other two factors. With the aid of a deep learning network, we are offering a way to determine whether pupils in a classroom have donned masks to protect them from illness. Deep learning is a development in machine learning that produces results that are more accurate than those of traditional machine learning algorithms. We discuss the effectiveness of our deep learning-based face mask identification system. The kids' faces are recognised on the live classroom footage during analysis in order to identify those who are not wearing masks and to generate their names. In this essay, we will concentrate on college students who don't wear masks and are photographed. Then the fine will be automatically applied to that specific person.

Keywords : Deep Learning, Face Mask Detection, Person Identification.

I. INTRODUCTION

The disease brought on by the novel coronavirus known as COVID-19 has had a devastating global impact and has claimed many lives. The sole preventive method is to keep a physical distance and wear a face mask in public places. College campuses sent students home for a year, and some institutions started offering classes and exams online before places of worship, eateries, and stores started to stop in reaction to the coronavirus outbreak. However, it is less successful than physical education. As a result, educational institutions have started operating under the laws and standards that the government has insisted upon, one of which is that wearing a face mask inside of educational facilities is now required.

Whether or whether the students are wearing masks, it is impossible to constantly watch over them. Therefore, we believed that the optimum approach for monitoring the students would be one based on computer vision. A more effective answer to this issue will be provided by an automatic face mask detecting system used in a classroom. In addition to introducing a face mask recognition system based on deep learning that uses the ResNet50 CNN architecture, this study also provides a list of pupils who did not wear masks within the classroom. The face mask identification in the model, which prevents the transmission of COVID19, is done using live footage from the classroom camera.

Face recognition technology, a crucial area of biometric identification, is characterised by easy acquisition and high reliability, and it is extensively employed in the surveillance of traffic, national security, and information security. Numerous face recognition techniques exist, and they can be broadly categorised into two groups: local methods and global methods. Local approaches include local descriptor Gabor, local binary patterns (LBP), and others. The alternative is a method that is global in nature and uses traditional face recognition techniques like the feature face method, linear discrimination analysis algorithm, and others. Principal component analysis (PCA), LBP, and deep learning algorithms are currently the focus of research. In terms of face recognition success rates and difficulty of realisation, these three techniques perform better. Principal component analysis and the LBP algorithm, however, have drawbacks that prevent them from completing frame-by-frame recognition and adapting to different lighting circumstances. These drawbacks include inadequate robustness, a low recognition rate, and an increased time need. The function of face recognition on the FPGA platform (based on the theory of deep learning) will be explored in this paper, which will considerably enhance performance.

II. Related Work

[1]. Face Mask Detection using Transfer Learning of InceptionV3 G. Jignesh Chowdary , Narinder Singh Punn , Sanjay Kumar Sonbhadra , and Sonali Agarwal, January 2020.DOI:10.1007/978-3-030-66665-1_6

The fast spread of the coronavirus is causing a severe health disaster throughout the world (COVID-19). The World Health Organization (WHO) released a number of recommendations to prevent the spread of coronavirus. Wearing a mask in public and busy settings is the most effective COVID-19 prevention strategy, according to the WHO. In these places, it is exceedingly challenging to manually keep an eye on individuals. The identification of those who are not wearing masks is automated in this paper using a transfer learning model. The cutting-edge deep learning model, InceptionV3, which has already been trained, is tweaked to create the suggested model. The Simulated Masked Face Dataset is used to train and evaluate the suggested model (SMFD). To overcome the limited data availability for better model training and testing, an image augmentation technique is used. By obtaining an accuracy of 99.9% during training and 100% during testing, the model surpassed the other recently proposed methods.

[2].Retinafacemask: A Face Mask Detector Mingjie Jiang, Xinqi Fan, Hong Yan. (8 Jun 2020). https://doi.org/10.48550/arXiv.2005.03950

The world has been significantly impacted by Coronavirus 2019. Wearing masks in public areas is a successful method of keeping people from getting sick. Some public service providers only allow customers to utilise their services if they are correctly masking themselves. However, there aren't many studies that look at automatic face mask detection. In this paper, we suggested the first high-performance one stage face mask detector, RetinaFaceMask. First, we created a new dataset with these annotations to address the

problem that prior research had difficulty differentiating between proper and erroneous mask wearing situations. Second, we suggested a context attention module that would concentrate on learning aspects that could be associated with wearing a face mask. Third, we applied the knowledge we had gained from the face detection challenge, following an idea from how people develop their skills by mastering similar activities. The benefits of the suggested model were demonstrated through ablation research. Experimental results on both fresh and public datasets showed that our model performed at the cutting edge.

[3].Susanto, FebriAlwan Putra, Riska Analia, IkaKarlina Laila NurSuciningtyas.(2020). The Face Mask Detection

The World Health Organization (WHO) acknowledged that the novel Coronavirus illness (COVID-19) case, which emerged quickly in Wuhan, China in December 2019, is a hazardous virus that can spread from human to human by droplets and aerosol. Regarding preventive, it's imperative to use a face mask when going outside or interacting with others. However, some careless individuals have so many justifications for refusing to use face masks. Additionally, the development of the face mask detector is essential in this scenario. This study attempts to create a face mask detector that can recognise various types of face masks. A YOLO V4 deep learning method has been selected as the mask detection algorithm in order to identify the face mask. The equipment has been placed at Politeknik Negeri Batam, and the experimental results have been applied in real-time. According to the trial findings, even when a person is shifting to a different position, this gadget can accurately identify whether or not they are wearing a face mask.

[4].Hong Lin, Rita Tse, Su-Kit Tang, Yanbing Chen, Wei Ke, Giovanni Pau. (2021). Near-Realtime Face Mask

COVID- The 19 pandemic has resulted in significant monetary and human cost. Face masks act as the first line of defence against infection when worn in public areas. In this paper, we provide a novel near-realtime approach that combines human posture recognition with convolutional neural network to automatically detect face mask wear (CNN). In the original photos, we do background filtering and spatial reduction using the strength of human position recognition. A trained CNN model uses the results to determine whether the subject is wearing a mask. By using Open Pose to find the facial region and identify the human body's skeleton, we are able to spatially reduce the amount of data that the CNN framework needs to process. Then, to determine whether a face mask is present, we use supervised learning methodology. CNN is trained utilising photographs that have been cropped to the alleged area covered by a face mask. By using this method, the complexity of the neural network was significantly reduced while the recognition accuracy was increased. Images captured in public spaces at various times of day and from various perspectives have been used to test the system in a variety of circumstances. Overall, our approach achieves a nighttime recognition accuracy of 94.6 percent and a daylight recognition accuracy of 95.8 percent.

[5].Rahman, M. M., Manik, M. M. H., Islam, M. M., Mahmud, S., & Kim, J.-H. (2020). An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network. 2020 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS). doi:10.1109/iemtronics51293.2020

The new coronavirus that caused the COVID-19 pandemic is still spreading throughout the world today. COVID-19's effects have been felt in practically all development-related fields. There is a problem in the healthcare system. Wearing a mask is one of many precautions that have been done to stop the spread of this disease. In this research, we provide a method that limits the spread of COVID-19 by

identifying individuals in a network of smart cities where all public spaces are watched over by Closed-Circuit Television (CCTV) cameras. When a person without a mask is found, the municipal network alerts the appropriate authority. A dataset of photos of people wearing and not wearing masks that was gathered from multiple sources was used to train a deep learning architecture. For never-before-seen test data, the trained architecture distinguished between persons wearing facial masks and those wearing none with 98.7 percent accuracy. Our research could potentially help many nations around the world by limiting the spread of this contagious disease.

[6]. Peng, J., Kang, S., Ning, Z., Deng, H., Shen, J., Xu, Y., … Liu, L. (2019). Residual convolutional neural network for predicting response of transarterial chemoembolization in hepatocellular carcinoma from CT imaging. European Radiology, 30(1), 413–424. doi:10.1007/s00330-019-06318-1

Background In order to predict patients' preoperative responses to transarterial chemoembolization for intermediate-stage hepatocellular carcinoma (HCC), we tried to construct and verify a deep learning model (TACE).

Method For 562 patients from Nan Fang Hospital (NFH), 89 patients from Zhu Hai Hospital Affiliated with Jinan University (ZHHAJU), and 138 patients from the Sun Yat-sen University Cancer Center, all computed tomography (CT) pictures were gathered (SYUCC). Using the outputs of a residual convolutional neural network and transfer learning methods, we created a prediction model (ResNet50). In two separate validation cohorts, the prediction accuracy for each patch was assessed again.

Results The deep learning model's accuracy in the training set (NFH) was 84.3 percent, and its areas under curves (AUCs) for complete response (CR), partial response (PR), stable disease (SD), and progressing illness (PD), respectively, were 0.97, 0.96, 0.95, and 0.96. The deep learning model's accuracies for CR, PR, SD, and PD in the other two validation sets (ZHHAJU and SYUCC) were 85.1 percent and 82.8 percent, respectively. The objective response to TACE therapy in patches and patients from three cohorts was likewise accurately predicted by the ResNet50 model with high AUCs. The ResNet50 model had a substantial net benefit in the two validation cohorts, according to decision curve analysis (DCA).

[7].Saini Pooja, Saini Preeti. (2021). Face Mask Detection Using AI. Predictive and Preventive Measures for Covid, January 2021, DOI:10.1007/978-981-33-4236-1_16

The population has understood that they are entering a new world as a result of Covid-19's construction of an entirely new frequency. We must be quick to respond to new requirements that have engulfed us all since our society is currently rapidly changing. Everyone will prioritise creating risk-free environments so that life can function as it did previously. We must make decisions to protect everyone returning to our workplace and to keep ourselves and our loved ones free from harm. Every day, fresh plans are being methodized to comply with regulations and policies. Although face masks are becoming a new implemented norm for daily living, it is still vital to be vigilant throughout the day and to take action against individuals who are not wearing masks in public places or at work in order to create a safe environment that contributes to public safety. The acceptance of Covid tracking technologies for safety seems to be widespread in society. Face mask detector is one of the most vital gadgets. This technique makes it possible to determine who is missing the appropriate face mask. These technologies use cutting-edge neural network algorithms in conjunction with current surveillance systems to determine whether or not someone is wearing a face mask. This chapter will provide a quick overview of artificial intelligence, including its subfields of machine learning and deep learning. Deep learning frameworks will then be followed by a

straightforward face mask detection system implementation.

[8].Meenpal, T., Balakrishnan, A., & Verma, A. (2019). Facial Mask Detection using Semantic Segmentation. 2019 4th International Conference on Computing, Communications and Security (ICCCS). doi:10.1109/cccs.2019.8888092

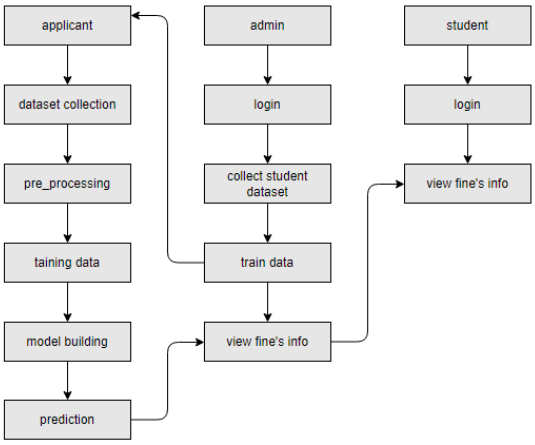
In image processing and computer vision, the problem of face detection has become quite common. In order to make the algorithm as accurate as possible, numerous new algorithms are being developed employing convolutional structures. The extraction of even pixel-level features is now achievable because to convolutional structures. We want to create a binary face classifier that can recognise each face in the frame, regardless of alignment. We offer a technique for creating precise face segmentation masks from input images of any size. The approach starts with an RGB image of any size and extracts features using Predefined Training Weights of VGG - 16 Architecture. Fully Convolutional Networks are trained to semantically separate the faces contained in the image. Binomial Cross Entropy is utilised as a loss function, and Gradient Descent is employed for training. Further processing of the FCN output image includes removing undesired noise, avoiding any incorrect predictions, and creating bounding boxes around the faces. Additionally, the suggested model has achieved excellent results in identifying non-frontal faces. Additionally, it has the ability to recognise several facial masks in a single frame. Research on the Multi Parsing Human Dataset produced segmented face masks with a mean pixel level accuracy of 93.884 percent.

III. Proposed Method

Our technology will be able to determine whether someone is wearing a mask or not because the WHO has mandated that mask use during the COVID-19 pandemic in order to safeguard against this lethal virus. And here, a fine for a person without a mask will be recorded. We will construct a deep learning in this project. Utilizing Python, Opens, Tensor Flow, and Keas, we will develop a COVID-19 face mask detector using the dataset. Our objective is to determine whether the individual in the image or video stream is wearing a face mask, and if not, a penalty will be applied.

Use the face mask dataset to put the proposed approach into operation in a live application.

Block Diagram:



Block diagram of proposed method

IV. Conclusion

An impartial dataset of masked and unmasked faces was produced for this application. After creating a dataset, Face Mask Classifier models are trained on it and evaluated depending on how well they categorise faces as masked or not. This method can be simply implemented for automatic monitoring of the use of face masks at universities, helping to make them safer during the COVID-19 pandemic as the world tries to go back to normal and people resume in-person work. When a person is not wearing a mask, their face is instantly captured and recognised as being fine. A fine based on the number of captures without a mask will be applied.

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