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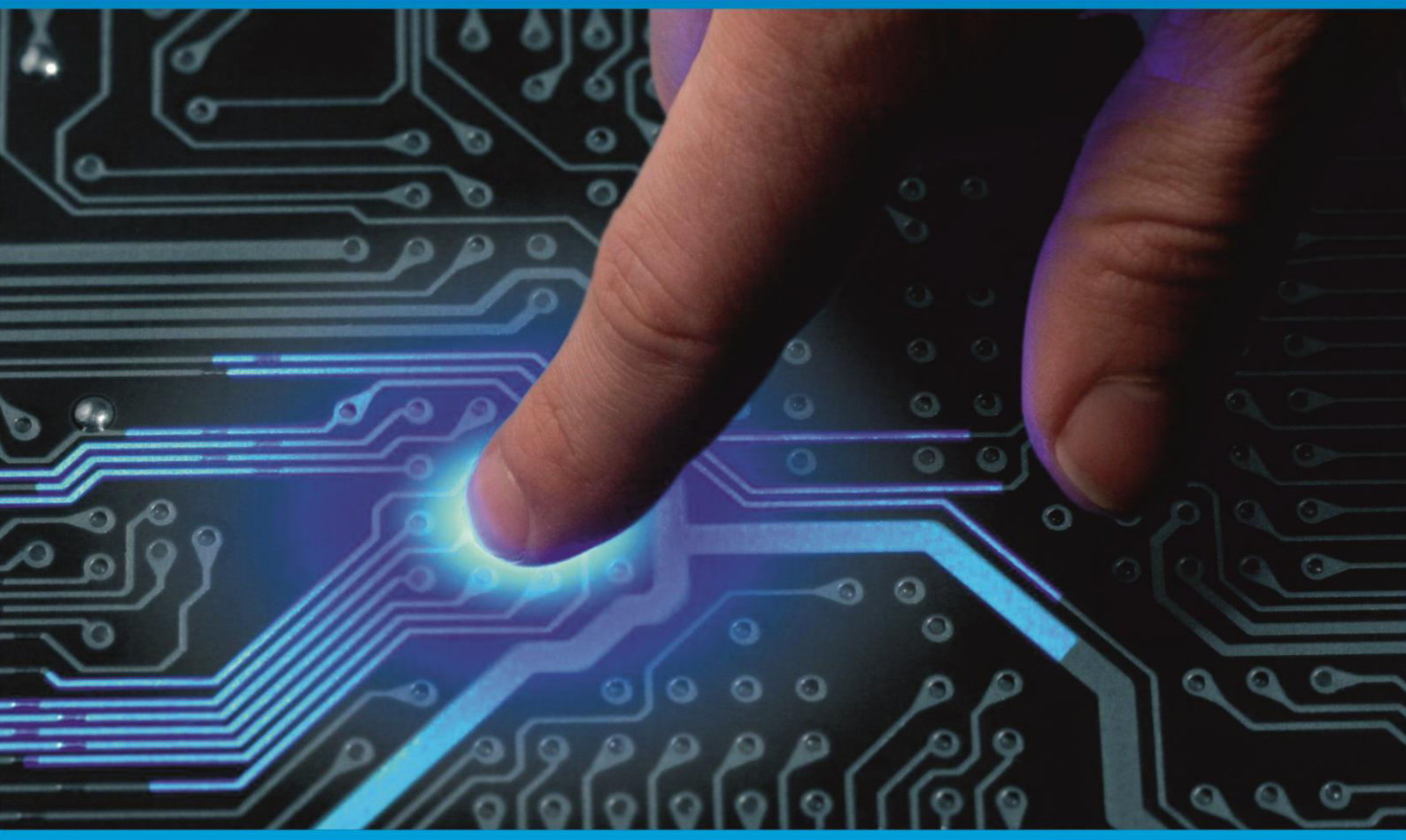

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A Survey on Mask Detection with Sanitization Tunnel for Covid-19

Tambe Arti Sudam[1],Tapase Sandesh Sanjay[2], Shaikh Ajajahmed Khalil[3],

Parad Harshad Bhaskar[4], Meherkhamb Akshay Raju[5], S. A. Thanekar[6]

UG Student, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[1]

UG Student, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[2]

UG Student, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[3]

UG Student, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[4]

UG Student, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[5]

Professor, Dept. of Computer Engineering, AVCOE, Sangamner, Maharashtra, India[6]

ABSTRACT: Covid19 has given a new identity for wearing a mask. Accurately and efficiently detecting masked faces is increasingly meaningful. As a unique face detection task, face mask detection is much more difficult because of extreme occlusions which leads to the loss of face details. Besides, there is almost no existing large-scale accurately labeled masked face dataset, which increase the difficulty of face mask detection. The CNN-based deep learning algorithms has made great breakthroughs in many computer vision areas including face detection. In this paper, we propose a new CNN-based cascade framework, which consists of three carefully designed convolutional neural networks to detect face mask. Besides, because of the shortage of face masked training samples, we propose a new dataset called" face mask dataset" to finetune our CNN models. We evaluate our proposed face mask detection algorithm on the face mask testing set, andit achieves satisfactory performance. In this, we propose a new CNN-based cascade framework, which consists of three carefully designed convolutional neural networks to detect-face mask and its type. Besides, we have made provision for sanitization tunnel after first task of detecting proper mask and checking body temperature

KEYWORDS: Face mask, CNN, Face detection, Deep learning, N95

I. INTRODUCTION

At the end of this decade, face has got a new identification due to rise in COVID-19 cases. COVID-19 19 is a virus which gets inflicted when infected person comes in contact with any other person.Infected person can leave traces of virus on things around him. His spit or touch is observed to be mostinfectious medium to carry this virus. Hence as way of precaution people all around need to wear face mask to prevent them and everyone around them to get infected by the VIRUS. This discipline has been made compulsory which is helping in curbing the COVID-19 cases. Government have utilized strict law for wearing mask when in public area. People are fined for not wearing mask or not wearing it properly. Keeping the need of time in mind we have proposed a method for detecting the mask on face. The paper proposes a step wise method to detect the block of face in images and surveillance videos. The next step involves detection of mask on this block. Further steps involve whether the maskis worn properly or not. The first step of face detection is one of the longest-researched computer vision problem, which can be traced back about half a century ago. However, most of the early face detection algorithms cannot meet the practical need. In 2001, Viola and Jones's seminal work," Viola- Jones face detector", made it possible for real-time face detection in practice [1]. The Viola Jones face detector consists of a series of classifiers ranging from simple to complex ones. Later researchers continued to study based on it, and many of them apply more complex and descriptive features [2,3,4] to make the detector more powerful. In recent years, deep learning has made great breakthroughs in many computer vision areas, such as general object detection, object classification, object segmentation and of course, face detection. Deep learning does not need to manually design features, as the CNN (Convolutional Neural Networks) can automatically take learning useful features from the training images. The proposed system involves use of cascaded CNN for face detection and detection of mask at later stage. The system will help detect the people wearing mask as well people not wearing mask. This in course will help to bring discipline to public as well

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precaution through which they can easily roam around and help curb the COVID-19 infection. The system further extends to create sanitization tunnel which involves the IoT part of system wherein tunnel is activated after detection ofproper mask.

II. LITERATURE SURVEY

A. Learning surf cascade for fast and accurate object detection.

The paper presents SURF cascade for fast and accurate object detectors. The proposed approach brings three key improvements over the Viola-Jones framework. First, authors introduce some variant of SURF features for fast and accurate object detection. Second, they have proposed AUC as the single criterion for cascade optimization. Third, they show a real example that can train cascade object detector from billions of samples within one hour on personal computers. They compared SURF cascade detector with existing algorithms on detection accuracy and speed. Experiments show that SURF cascade can achieve results on par with state-of the-art detectors, while beats tailored optimized OpenCV detector in detection speed.[6]

B. Rich feature hierarchies for accurate object detection and semantic segmentation

This paper presents a simple and scalable object detection algorithm that gives a 30% relative improvement over the best previous results on PASCAL VOC 2012. The authors achieved this performance through two insights. The first is to apply high-capacity convolutional neural networks to bottom-up region proposals in order to localize and segment objects. The second is a paradigm for training large CNNs when labeled training data is scarce. They show that it is highly effective to pre- train the network— with supervision—for a auxiliary task with abundant data (image classification) andthen to fine-tune the network for the target task where data is scarce (detection). They have conjectured that the "supervised pre-training/domain-specific finetuning" paradigm will be highly effective for a variety of data-scarce vision problems. They conclude by noting that it is significant that they achieved these results by using a combination of classical tools from computer vision and deep learning (bottom up region proposals and convolutional neural networks).[7]

C. Spatial pyramid pooling in deep convolutional networks for visual recognition

SPP is a flexible solution for handling different scales, sizes, and aspect ratios. These issues are important in visual recognition, but received little consideration in the context of deep networks. Authors have suggested a solution to train a deep network with a spatial pyramid pooling layer. The resulting SPP-net shows outstanding accuracy in classification/detection tasks and greatly accelerates DNN-based detection. Their studies also show that many time-proven techniques/insights in computer vision can still play important roles in deep-networks-based recognition.[8]

D. A Cascade Framework for Masked Face Detection

In this paper, authors propose a new deep learning-based algorithm for masked face detection. Their algorithm is based on a newly designed CNN cascade framework consists of three CNNs. Besides, they propose a new dataset called" MASKED FACE dataset" which have 160 images for training and 40 images for testing. In order to overcome the overfitting problem due to the insufficient of training samples, we pre-train our models with the WIDER FACE dataset, and fine-tune them with the MASKED FACE training set. They have evaluated masked face detection algorithm on the MASKED FACE testing set and it achieves very satisfactory performance.[9]

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III. SYSTEM ARCHITECTURE

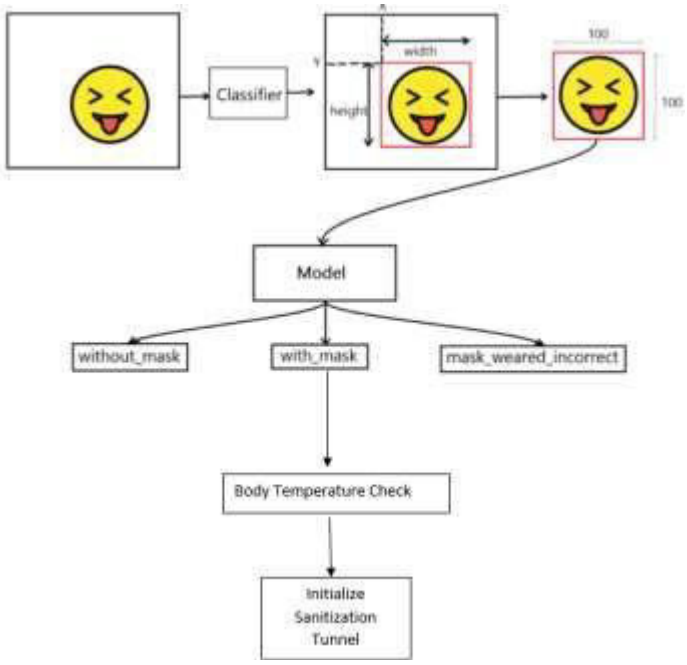

Fig: System Architecture

IV. CONCLUSION AND FUTURE WORK

The proposed system is most useful utility in recent times to detect the mask on face. The cascade model used for face detection and further to identify the individual who are not wearing or who are notproperly wearing the mask so that proper precaution and discipline is utilized to stop the spread of virus. Initialization of Sanitization tunnel after body temperature check extends the system on IoT platform. As a social cause this system can be implemented at malls as well at public places to curb spread of virus. For future work, the same system can be utilized for face detection with mask on to further identify more features on facial region.

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