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LIVE FACE MASK DETECTION USING CNN

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ABSTRACT

Face Detection has evolved as a awfully popular problem in Image processing and Computer Vision. Many new algorithms are being devised using convolutional architectures to form the algorithm as accurate as possible. We aim to style a binary face classifier which could detect any face present within the frame regardless of its alignment. We present the thanks to induce accurate face segmentation masks from any arbitrary size input image. Beginning from the RGB image of any size, the strategy uses Predefined Training Weights of VGG - 16 Architecture for feature extraction. Training is performed through Fully Convolutional Networks to semantically segment out the faces present during this image. Gradient Descent is employed for training while Binomial Cross Entropy is employed as a loss function. Further the output image from the FCN is processed to induce eliminate the unwanted noise and avoid the false predictions if any and make bounding box round the faces. Face Mask Detection system built with OpenCV, Keras / TensorFlow using Convolutional Neural Network, Deep Learning and Computer Vision concepts so on detect face masks in static images also as in real-time video streams.

Keywords: Face Mask Detection, Convolutional Neural Network, Mobilenetv2, Corona Virus Precaution.

I. INTRODUCTION

Coronaviruses (CoV) are an oversized group of viruses which cause illness that range from colds to deadly infections like countryside Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [1]. the first infected tolerant coronavirus has been found in December 2019. From that period, COVID-19 has become a pandemic everywhere the world [2]. People everywhere the world face challenging situations because of this pandemic. daily an oversized number of people are being infected and died. At the time of penning this paper, almost 16,207,130 infected cases are confirmed where 648,513 are death [3]. This number is increasing day by day. Fever, dry cough, tiredness, diarrhea, loss of taste, and smell are the key symptoms of coronavirus which is alleged by the world Health Organization (WHO) [4]. Among them cleaning hands, maintaining a secure distance, wearing a mask, refraining from touching eyes, nose, and mouth are the foremost, where wearing a mask is that the only one.

COVID-19 is also a disease that spread from human to human which could be controlled by ensuring proper use of a facial mask. The spread of COVID-19 are limited if people strictly maintain social distancing and use a facial mask. Very sadly, people aren't obeying these rules properly which is speeding the spread of this virus. Detecting the people not obeying the principles and informing the corresponding authorities are a solution in reducing the spread of coronavirus.

A mask detection could also be a way to hunt out whether someone is wearing a mask or not. it's a bit like detect any object from a scene. Many systems are introduced for object detection. Deep learning techniques are highly employed in medical applications [5], [6]. Recently, deep learning architectures have shown an interesting role in object detection. These architectures are incorporated in detecting the mask on a face. Moreover, a wise city means an geographical area that consists of the numerous IoT sensors to collect data. These collected data are then accustomed perform different operations across town. This includes monitoring traffic, utilities, installation network, and lots of more. Recently, the expansion of COVID-19 is reduced by detecting the facial mask in an exceedingly smart city network. This paper aims at designing a system to hunt out out whether someone is employing a mask or not and informing the corresponding authority in an exceedingly smart city network. Firstly, CCTV cameras are accustomed capture real-time video footage of assorted public places within the town. From that video footage, facial images are extracted and these images are accustomed identify the mask on the face. the training algorithm Convolutional Neural Network (CNN) is

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utilized for feature extraction from the images then these features are learned by multiple hidden layers. Whenever the architecture identifies people without mask this information is transferred through town network to the corresponding authority to need necessary actions. We also represented a system which is able to ensure proper enforcement of the law on those that don't seem to be following basic health guidelines during this pandemic situation.

II. METHODOLOGY

We proposed an automatic smart framework for screening persons who aren't employing a mask during this paper. within the smart city, all public places are monitored by CCTV cameras. The cameras are accustomed capture images from public places; then these images are feed into a system that identifies if someone without mask appears within the image. If someone without a mask is detected then this information is shipped to the right authority to wish necessary actions. We used python script, tensor flow, and CNN as deep learning architecture to develop an efficient network for recognizing facemasks. Our objective is to show a specialized CNN model to detect whether or not someone is wearing a mask. The project can instantly detect the faces of the mask or without mask from any angle. For any orientation it generates output from an Red Green Blue (RGB) input image. the first responsibility of this function is to extract characteristics from photographs and predict which class they belong to.

The feature extraction approach sketches the image and transforms it into a replacement image, which is more efficient than the previous image. The dimensionality of photographs is reduced to an efficient representation during this section. In our recommended concept, the camera is additionally utilized to acknowledge the mask face. First resize the input image to 100*100 and extract also forecast features.

We are provided some model data with their accuracy level when the training phase is finished. The implementation of the project is disbursed in python notebook. Libraries like pandas, NumPy, matplotlib, sklearn, etc. are used. to coach the Convolutional Neural Network model and to run the python code for the project the subsequent libraries with the given or higher version is required:

TensorFlow 1.15.2, Keras 2.3.1, NumPy 1.18.2, Matplotlib 3.2.1, SciPy 1.4.1, Imutils 0.5.3, OpenCV-python 4.2.0.*

To train the mask detector, we've to divide our project into two stages:

Training: We are going to collect our facial mask detection record of a tough drive to make a model (with keras / tensorflow) and at last serialize the facial mask detector on the disk.

Testing: After the mask detector has been trained, we charge the mask detector, perform face recognition, and so decide whether each face is provided with or without a mask. Also, it'll require a webcam.

III. IMPLEMENTATION

We used python script, tensor flow and CNN as deep learning architecture to make an efficient network for the detection of facemasks. Our purpose is to coach a custom CNN model to detect if an individual is wearing a mask or not. This project able to detect the mask's faces in no time from every possible angle. It takes an input image in RGB from any orientation to obtaining output. the most work of this function is feature extraction and sophistication prediction to the photographs. In the feature extraction system, the image get sketched and created into a replacement image where the image that generated is more efficient than the previous image. The Dimensionality of images get reduced during this part to an to an efficient representation. In our proposed model mask face are often detected using the webcam. Firstly the scale of the input image resize 100*100 and perform feature extraction and prediction. After completion the training and testing process it gives us some model data with their accuracy level. later using that model we are going to predict the end result using web-cam.

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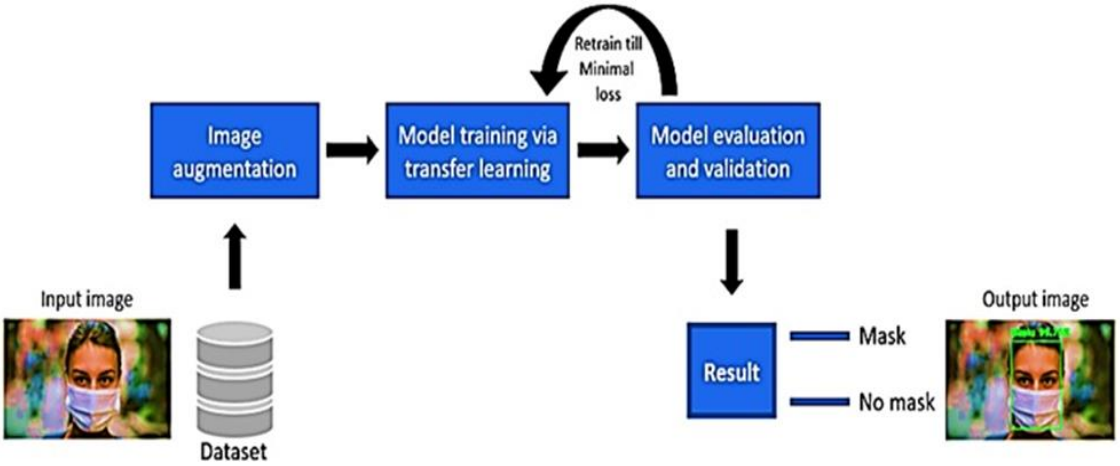

Figure 1: Working Implementation

Convolutional Neural Network (CNN) Implementation:

CNN is analogous to "standard" neural networks, through-out the context that they need been completely invented of hidden layers with "learnable" specifications of neurons. These neurons obtain inputs, perform a scalar product so proceed with non-linearity. the whole network communicates the correlation between the raw pixels of images and their classification ratings.

The Convolutional Neural Network is a deep neural network that typically takes images as input, trains features based on bias and weights, the value of which is randomly selected technically, Every input image passes through a sequence of kernels, pooling layers, convolution layers, fully connected layers (FCs) and uses Softmax to define an image with stochastic values between 0 and 1.

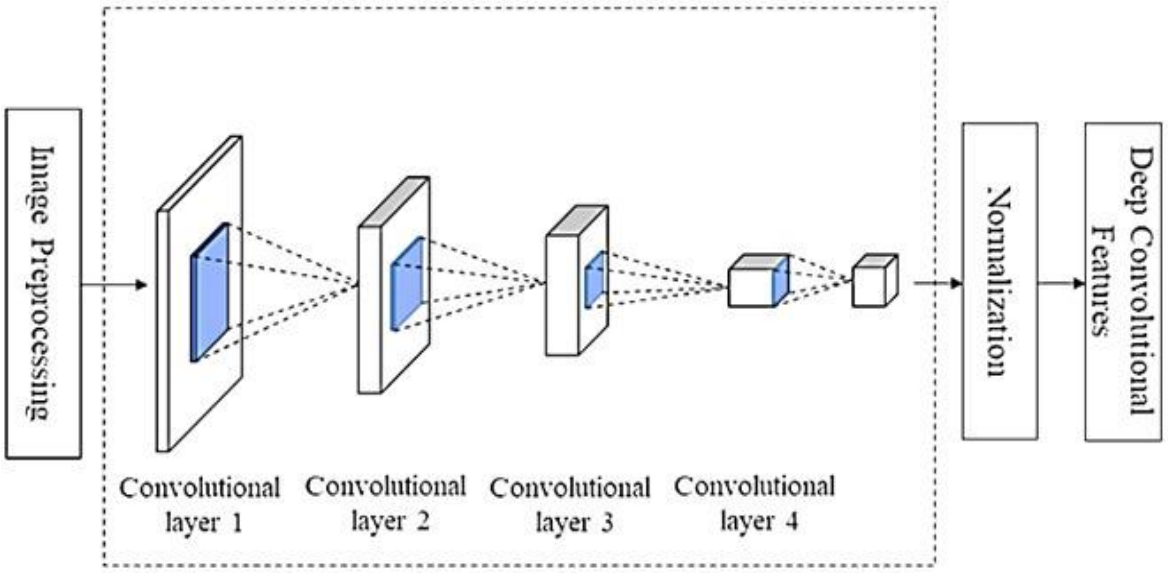

Figure 2: Convolutional Neural Network [CNN] Implemention

• The very first layer where information springs from an input image is Convolution .The relationship among pixels through the utilization of little squares in data input to amass image properties is preserved by convolution.

• Pooling layers can optimize parameter counts whenever the photographs are only too large. The Max pooling extracted with the biggest factor from the rectified function diagram. It could placed on the typical pooling even the most important portion. List of all Map Elements feature names as Sum pooling during this proposed model, four convolution layers are implemented using 16, 16, 32, 32 filters respectively with size 3 × 3 and Relu is employed as an activation.

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Dataset: We have used 11648 images as dataset from that Images taken with a mask: 5890 and Images taken without a mask: 5758. For training and testing purpose we divided data as follow:

Table 1: Dataset of training and testing

Data Set	Training	Testing
With Mask	3725	2165
Without Mask	3828	1930

GUI:

Figure 3: GUI Screenshot of Interface

IV. RESULTS AND DISCUSSION

This project presents a system for a sensible city to scale back the spread of coronavirus by informing the authority about the one that isn't wearing a facial mask that's a precautionary measure of COVID-19. The motive of the work comes from the people disobeying the principles that are mandatory to prevent the spread of coronavirus. The system contains a mask detection architecture where a deep learning algorithm is employed to detect the mask on the face. to coach the model, labeled image data are used where the pictures were facial images with masks and without a mask.

The proposed system detects a mask with an accuracy of 98.7%. the choice of the classification network is transferred to the corresponding authority. The system proposed during this study will act as a valuable tool to strictly impose the utilization of a facial mask publicly places for all people

Figure 4: Accuracy and Training Loss

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Model Accuracy: 98.7%

Without Mask:

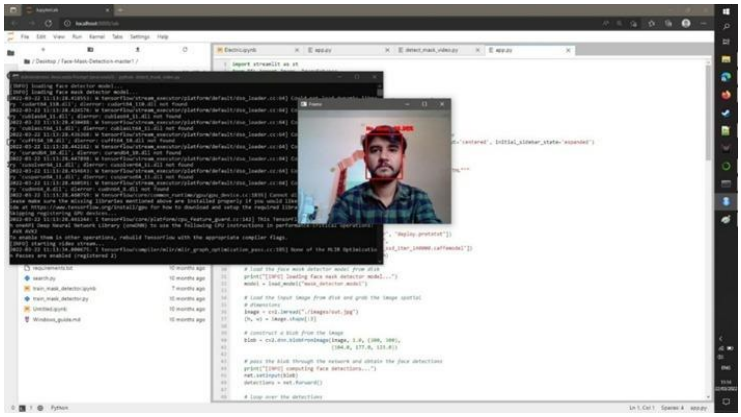

Figure 5.1: Live Mask Detection Through Webcam (Without Mask)

With Mask:

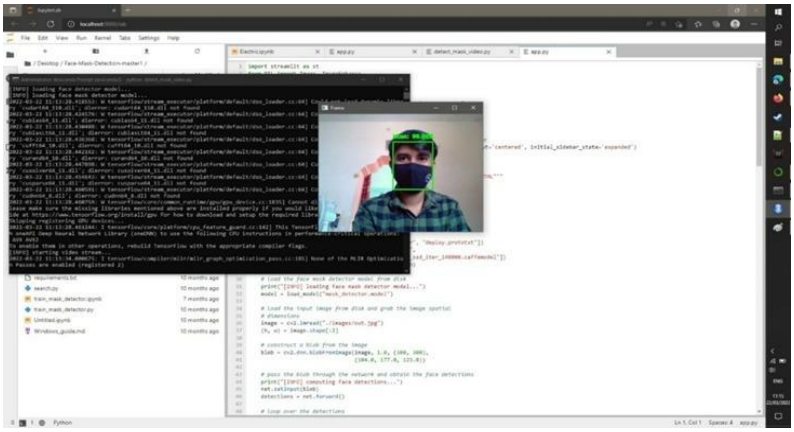

Figure 5.2: Live Mask Detection Through Webcam (With Mask)

V. CONCLUSION

This mask recognition system could be a excellent and efficient thanks to do so. The system will separate the people from the group who don't seem to be wearing mask. The identification of individuals, violating the COVID norms increases the adaptability of the mask detection system for the general public sake. If applied during a correct way, the mask detection system may well be accustomed make sure our safety and for others too. This helps in achieving high precision as well as enhance the face detection tempo considerably. The system will be applied in many areas like metro stations, markets, schools, railway stations and lots of other crowded places to observe the group and to confirm that everybody is wearing mask. Finally, this work is used for future researchers and enthusiasts. Firstly, this model are often employed in any high-definition camcorders, this can confirm that this model isn't limited to only mask detection system. Secondly, this could be used for biometric scans with a mask on the face.

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VI. REFERENCES

[1] T.-H. Kim, D.-C. Park, D.-M. Woo, T. Jeong, and S.-Y. Min, "Multi-class classifier-based adaboost algorithm," in Proceedings of the Second Sinoforeign interchange Conference on Intelligent Science and Intelligent Data Engineering, ser. IScIDE'11., Heidelberg: Springer-Verlag, 2012, pp. 122–127.Ganesh Kumar and P.Vasanth Sena, "Novel Artificial Neural Networks and Logistic Approach for Detecting Credit Card Deceit," International Journal of Computer Science and Network Security, Vol. 15, issue 9, Sep. 2015, pp. 222-234

[2] P. Viola and M. J. Jones, "Robust real-time face detection," Int. J. Comput. Vision, vol. 57, no. 2, pp. 137–154, May 2004..

[3] P. Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features," in Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition. CVPR 2001, vol. 1, Dec 2001, pp. I–I.

[4] J. Li, J. Zhao, Y. Wei, C. Lang, Y. Li, and J. Feng, "Towards real world human parsing: Multiple-human parsing in the wild," CoRR, vol. abs/1705.07206.

[5] A. Krizhevsky, I. Sutskever, and G. E. Hinton, "Imagenet classification with deep convolutional neural networks," in Advances in Neural Information Processing Systems 25, F. Pereira, C. J. C. Burges, L. Bottou, and K. Q. Weinberger, Eds. Curran Associates, Inc., 2012, pp. 1097–1105.

[6] R. Sujatha, Jyotir Chatterjee and Aboul ella Hassanien, "A machine learning methodology for forecasting of the COVID-19 cases in India," Apr 18,2020.[Accessed Feb. 10, 2021.