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COVID-19 Face Mask Detection

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Abstract: ***Face mask detection involves in detection the placement of the face then crucial whether or not it's a mask thereon or not. the problem is proximately cognate to general object notion to detect the categories of objects. Face identification flatly deals with identifying a particular cluster of entities i.e., Face. it's varied applications, like autonomous driving, education, police work, and so on. This paper presents a simplified approach to serve the above purpose using the basic Machine Learning (ML) packages such as TensorFlow, Keras, OpenCV and Scikit-Learn. The planned technique detects the face from the image properly and so identifies if it's a mask on that or not. As an investigation task performing artist, it ought to conjointly sight a face at the side of a mask in motion. The technique perform accuracy up to 95.77% and 94.58% respectively on two different datasets and count optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.***

Keywords: TensorFlow, Keras, OpenCV and Scikit- Learn

I. INTRODUCTION

Effective methods to restrain COVID-19 pandemic want high attention to mitigate negatively wedged communal health and world economy, with the brim-full horizon however to unfold. within the absence of effective antiviral and restricted medical resources, several measures area unit suggested by World Health Organization to regulate the infection rate and avoid exhausting the restricted medical resources.

Sporting a mask is among the non-pharmaceutical intervention measures that may be wont to cut the first supply of SARS-CoV2 droplets expelled by associate infected individual. no matter discourse on medical resources and diversities in masks, all countries area unit mandating coverings over the nose and mouth publicly.

To contribute towards communal health, this paper aims to plot a extremely correct and period technique that may expeditiously discover non-mask faces publicly and therefore, imposing to wear mask. In this paper simplified approach to serve the above purpose using the basic Machine Learning (ML) packages such as TensorFlow, Keras, OpenCV and Scikit-Learn. The proposed method detects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it should also detect a face along with a mask in motion.

The proposed methoddetects the face from the image correctly and then identifies if it has a mask on it or not. As a surveillance task performer, it can also detect a face along with a mask in motion.

The technique perform accuracy up to 95.77% and 94.58% respectively on two different datasets and count optimized values of parameters using the Sequential Convolutional Neural Network model to detect the presence of masks correctly without causing over-fitting.

II. REVIEW OF LITERATURE

A. Arjya Das, Mohammad Wasif Ansari, Rohini Basak, "Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV", IEEE, Feb 2021.

In this paper a simplified approach to attain this purpose exploitation some basic Machine Learning packages like TensorFlow, Keras, OpenCV and Scikit- Learn.

The planned technique detects the face from the image properly so identifies if it's a mask on that or not. As a surveillance task performing artist, it may sight a face together with a mask in motion. the strategy attains accuracy up to 95.77% and 94.58% severally on 2 completely different datasets.

We have a tendency to explore optimized values of parameters mistreatment the consecutive Convolutional Neural Network model to sight the presence of masks properly while not inflicting over-fitting. The outstanding performance of the planned model is extremely appropriate for video police work devices.

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B. M. Jiang, X. Fan and H. Yan, "Retina Mask: A FaceMask detector", Available: arXiv.org., 2020

The projected Retina Face Mask may be a one- stage detector, that consists of a feature pyramid network to fuse high-level linguistics data with multiple feature maps, and a completely unique context attention module to specialize in police investigation face masks. additionally, we tend to additionally propose a completely unique cross-class object removal formula to reject predictions with low confidences and also the high intersection of union. Experiment results show that Retina Face Mask achieves progressive results on a public mask dataset with a pair of 3% and 1.5% over the baseline lead to the face and mask detection preciseness, severally, and 11.0% and 5.9% over baseline for recall. Besides, we tend to additionally explore the likelihood of implementing Retina Face Mask with a light- weighted neural network Mobile Net for embedded or mobile devices.

C. Shilpa Sethi, Mamta Kathuria, and Trilok Kaushik, "Face mask detection using deep learning: An approach to reduce risk of Coronavirus spread",Elsevier Public Health Emergency, JUNE 2021

The planned technique is ensemble of one-stage andtwo-stage detectors to realize low logical thinking time and high accuracy. we tend to begin with ResNet50 as a baseline and applied the construct of transfer learning tofuse high-level linguistics info in multiple feature maps. additionally, we tend to conjointly propose a bounding box transformation to enhance localization performance throughout mask detection. The experiment is conducted with 3 well-liked baseline models viz. ResNet50, AlexNet and MobileNet. We tend to explored the likelihood of those models to plug-in with the planned model in order that extremely correct results may be achieved in less logical thinking time. it'sascertained that the planned technique achieves highaccuracy (98.2%) once enforced with ResNet50. Besides, the planned model generates eleven.07% and 6.44% higher exactness and recall in mask detection compared to the recent public baseline model revealed as Retina Face Mask detector. The outstanding performance of the planned model is extremely appropriate for video police work devices.

III. METHODOLOGY

Input: Dataset including faces with and without masks
Output: Categorized image depicting the presence of face mask
for *each image in the dataset* **do**
  Visualize the image in two categories and label them
  Convert the RGB image to Gray-scale image
  Resize the gray-scale image into 100 x 100
  Normalize the image and convert it into 4 dimensional array
end
for *building the CNN model* **do**
  Add a Convolution layer of 200 filters
  Add the second Convolution layer of 100 filters
  Insert a Flatten layer to the network classifier
  Add a Dense layer of 64 neurons
  Add the final Dense layer with 2 outputs for 2 categories
end
Split the data and train the model

Figure 1: Algorithm for proposed work

The proposed method consists of a cascade classifier and a pre-trained CNN which containstwo 2D convolution layers connected to layers of dense neurons.

1) *Data Processing Data Visualization:* Conversion of RGB image to Gray imageImage Reshaping
2) *Training of Model:* Building the model using CNN architecture Splitting the data and training the CNN model

A. Data Processing

Data preprocessing involves conversion of data from a given format to much more user friendly, desired and meaningful format. It can be in any form like tables, images, videos, graphs, etc. This organized information fit in with an information model or composition and captures relationship between different entities. The proposed method deals with image and video data using NumPy and OpenCV.

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1) *Data Visualization*

a) Data visualization is the process of transforming abstract data to meaningfulrepresentations using knowledge communication and insight discovery through encodings. It is helpful to study a particular pattern in the dataset

b) The total number of images in the dataset is visualized in both categories – 'with mask' and 'without mask'.

c) The statement categories=os. listdir(data_path) categorizes the list of directories in the specified data path. The variable categories now look like: ['with mask', 'without mask']

d) Then to find the number of labels, we need to distinguish those categories using labels= [i for i in range(len(categories))]. It sets the labels as: [0, 1]

e) Now, each category is mapped to its respective label using label_dict=dict(zip(categories, labels)) which at first returns an iterator of tuples in the form of zip object where the items in each passed iterator is paired together consequently. The mapped variable label_dict looks like: {'with mask': 0, 'without mask': 1}

2) *Conversion of RGB image to GRAY Image:* Modern descriptor-based image recognition systems frequently work on grayscale pictures, while not elaborating the strategy accustomed convert from color-to-grayscale. this is often as a result of the color- to-grayscale methodology is of very little consequence once using strong descriptors. Introducing nonessential data might increase the dimensions of coaching information needed to realize smart performance. As grayscale rationalizes the algorithmic program and diminishes the machine requisites, it's utilized for extracting descriptors rather than acting on color pictures outright

3) *Image Reshaping:* The input throughout relegation of a picture could be a three-dimensional tensor, wherever everychannel includes a distinguished distinctive pel. All the photographs should have identically equivalent size love 3D feature tensor. However, neither pictures ar usually coextensive nor their corresponding feature tensors. Most CNNs will solely settle for fine-tuned pictures. This engenders many issues throughout knowledge assortment and implementation of model. However, reconfiguring the input pictures before augmenting them into the network will facilitate to surmount this constraint. The images are normalized to converge the pixel vary between 0 and 1. Then they're regenerate to 4 dimensional arrays using data=np.reshape(data,(data.shape[0],img_size,img_size, 1)) wherever 1 indicates the Grayscale image. As, the final layer of the neural network has 2 outputs – with mask and while not mask i.e. it's categorical illustration,the information is converted to category.

B. *Training of Model*

1) *Building the Model using CNN Architecture:* The First Convolution layer is followed by corrected linear measure (ReLU) and Max Pooling layers. The Convolution layer learns from two hundred filters. Kernel size is about {3|to three} x 3 that specifies the peak and dimension of the 2nd convolution window. because the model ought to bear in mind of the form of the input expected, the primary layer within the model must be supplied with info concerning input form. Following layers will perform natural form reckoning. during this case, input shape is such as knowledge. Shape [1:] that returns the scale of the info array from index one. Default padding is "valid" wherever the special dimensions are sanctioned to truncate and also the input volume is non-zero cushioned. The activation parameter to the Conv2D category is about as "relu". It represents an around linear operate that possesses all the assets of linear models that may simply be optimized with gradient- descent ways. Considering the performance and generalization in deep learning, it's higher compared to different activation functions. max Pooling is employed to scale back the spacial dimensions of the output volume. Pool size is about to {3|to three} x 3 and also the ensuing output incorporates a form (number of rows or columns) of: shape_of_output = (input shape – pool_size + 1) / strides), wherever strides has default worth (1,1).

2) *Splitting the Data and Training the CNN Model:* After setting the blueprint to research the info, the model has to be trained employing a specific dataset then to be tested against a distinct dataset. a correct model and optimized train_test_split facilitate to supply correct results whereas creating a prediction. The test size is about to zero.1 i.e. 90th information of the dataset undergoes coaching and therefore the rest 100 pc goes for testing functions. The validation loss is monitored using Model Check point. Next, the pictures within the coaching set and therefore the check set are fitted to the serial model. Here, 200th of the training information is employed as validation information. The model is trained for twenty epochs (iterations) that maintains a trade-off between accuracy and chances of overfitting.

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IV. RESULT AND ANALYSIS

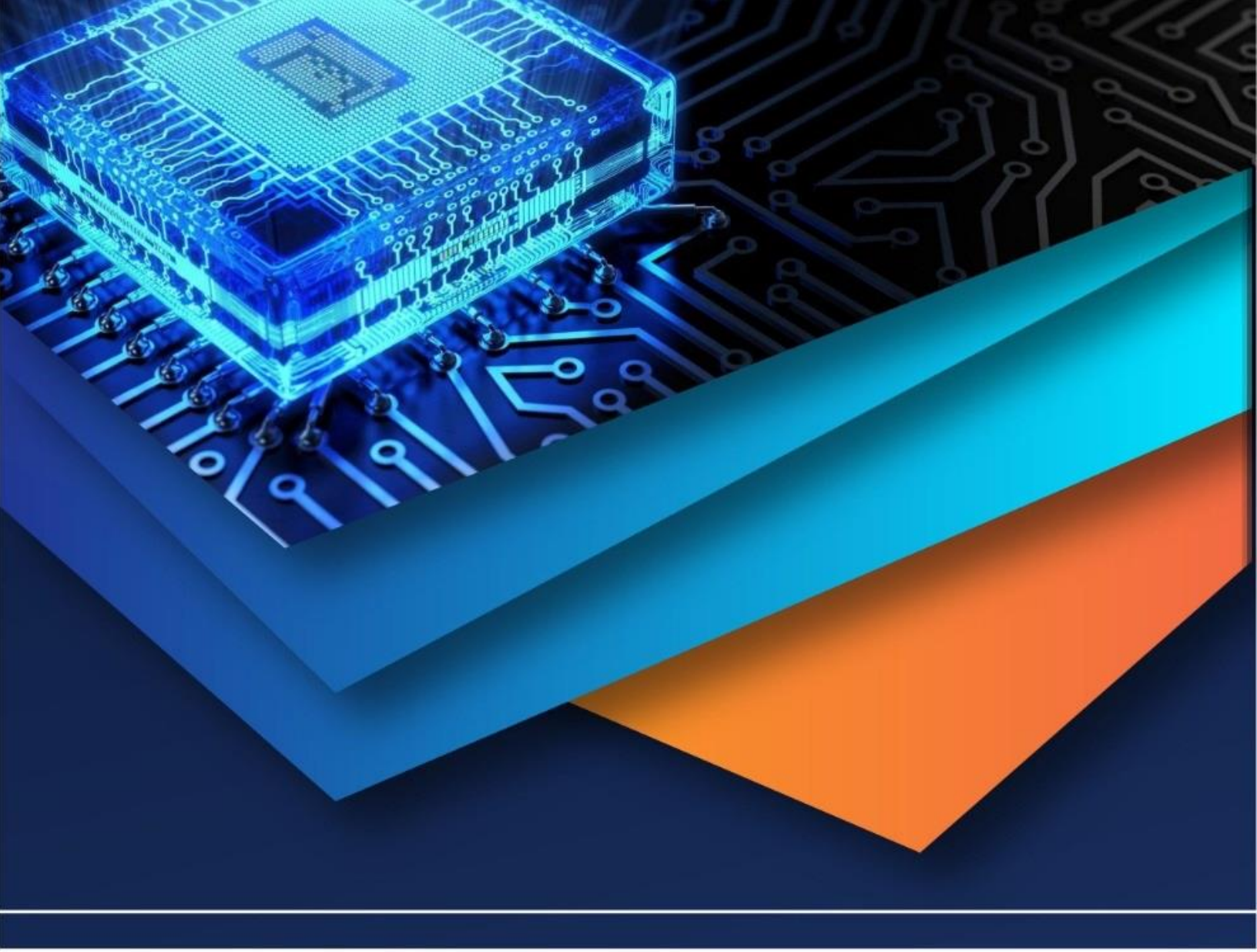
The model is trained, valid and tested upon 2 datasets. Comparable to dataset one, the tactic attains accuracy up to 95.77%. Half-dozen depicts however thisoptimized accuracy mitigates the value of error. Dataset a pair of is a lot of versatile than dataset one because it has multiple faces within the frame and differing types of masks having completely different colours further. Therefore, the model attains associate accuracy of 94.58% on dataset a pair. The distinction between coaching and validation loss comparable to dataset a pair of. One in every of the most reasons behind achieving this accuracy lies in Max Pooling. It provides rudimentary translation unchangingness to the inner illustration beside the reduction within the variety of parameters the model should learn. This sample-based discretization method down-samples the input illustration consisting of image, by reducing its spatiality. Variety of neurons has the optimized worth ofsixty-four that isn't too high. A way higher variety of neurons and filters will cause worse performance. The optimized filter values and pool size facilitate toseparate out the most portion (face) of the image to observe the existence of mask properly while not inflicting over-fitting.

V. CONCLUSION

In this paper, we have a tendency to in short explained the motivation of the work 1st. Then, we havea tendency to illustrated the training and performance task of the model. exploitation basic cubic centimeter tools and simplified techniques the strategy has achieved moderately high accuracy. It is often used fora spread of applications. carrying a mask is also obligatory within the close to future, considering the Covid-19 crisis. several public service suppliers can raise the purchasers to wear masks properly to avail of their services. The deployed model can contribute vastlyto the general public health care system. In future it is

REFERENCES

[1] Arjya Das, Mohammad Wasif Ansari, Rohini Basak, “Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV”, IEEE, Feb 2021
[2] M. Jiang, X. Fan and H. Yan, "Retina Mask: A Face Mask detector", Available: arXiv.org., 2020
[3] Shilpa Sethi, Mamta Kathuria, and Trilok Kaushik, “Face mask detection using deep learning: An approach to reduce risk of Coronavirus spread”, Elsevier Public Health Emergency, JUNE 2021
[4] "Advice on the use of masks in the context of COVID-19: interim guidance", 2020.
[5] "Coronavirus disease 2019 (covid-19): situation report 205", 2020.
[6] Dataset, https://github.com/prajnasb/observations, online accessed May 25, 2020 .
[7] Paris tests face-mask recognition software on metro riders, http://bloomberg. com/, online accessed May 25, 2020
[8] WHO coronavirus disease (covid-19)dashboard, https://covid19.who.int/, online accessed May 25, 2020
[9] Agarwal, S., Punn, N.S., Sonbhadra, S.K., Nagabhushan, P., Pandian, K., Saxena, P.: Unleashing the power of disruptive and emerging technologies amid covid 2019: A detailed review. arXiv preprintarXiv:2005.11507 (2020)
[10] Chollet, F.: Xception: Deep learning with depthwise separable convolutions. CoRR abs/1610.02357 (2016),



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