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 [ijrset@gmail.com](mailto:ijrset@gmail.com)

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# IOT Enabled Depthwise Separable Convolution Neural Network for Covid-19 Diagnosis and Classification

Somasundaram.R<sup>1</sup>, Divya Shree.U<sup>2</sup>, Sandhiya.S<sup>3</sup>, Sreethi.R<sup>4</sup>

Assistant Professor, Dept. of Electronics and Communications Engineering, Adhiyamaan College of Engineering, Hosur, Tamil Nadu, India <sup>1</sup>

U.G. Students, Dept. of Electronics and Communications Engineering, Adhiyamaan College of Engineering, Hosur, Tamil Nadu, India <sup>2,3,4</sup>

**ABSTRACT:**In recent times corona virus has reached its peak and caused several life losses. In general, pc pictorial representation (CT) is employed to observe tumors that cause respiratory disorder, TB, emphysema, or different serosa (the membrane covering the lungs) diseases. It is essential to spot and classify the illness through the utilization of image process techniques. So, The planned Depth Wise severable Convolution Neural Network model aims to observe each binary and multiple categories of COVID-19 by incorporating a group of methods particularly segmentation process, smart edge detection, grey scale conversion and classification. The experiment ensured the results of the DWS-CNN model by attaining most classification performance with the accuracy of ninety-eight.54% and 99.06% on binary and multiclass severally.

**KEYWORDS:**COVID-19, CNN-Convolutional-neural network ·Segmentation process, Canny edgedetection, Gray scale conversion, classification

## I. INTRODUCTION

The Covid-19 pandemic continues to possess a giant influence on the health and lifestyle of the worldwide population. the foremost necessary step for stopping Covid-19 is to observe infected patients effectively and impose immediate isolation. Patients infected by Covid-19 were found to gift Abnormalities in CT pictures, that makes it attainable to observe Covid-19 cases in clinical drugs. Also, the degree of infection are often assessed from CT pictures, that is useful for correct treatment and care. Recently, plenty of deep learning-based Covid19 case detection strategies are projected, a number of that are quite prosperous. However, the restricted amount of coaching cases and annotations remains the most challenge for up the classification accuracy of Covid-19. moreover, thanks to the low distinction of CT pictures, deep learning-based classification strategies have issue in process unsure and general info, like the pixels getting ready to boundary and pictures concerning non-Covid-19 cases. to resolve the on top of issues and because of the open supply Covid-19 dataset from the analysis community, we have a tendency to propose a belief function-based classification network to classify Covid-19 cases exploitation semi-supervised learning. The contribution of this project are often summarized as follows: 1) we have a tendency to propose a unique neural spec for Covid-19 detection from CT pictures composed of a convolutional network half for feature extraction and a belief function-based classification module; 2) the evidentiary neural network classifier maps image options into mass functions for improved Covid-19 case classification; 3) a semi-supervised coaching algorithmic rule is projected to coach the framework with partial annotations. we have a tendency to show that this work will contribute to a lot of reliable detection of Covid-19 cases and create the simplest use of relevant info from CT pictures.

Paper is organized as follows. Section II describes COVID-19 diagnosis and classification using depth wise seperable convolution neural network which are the techniques of image processing and deep learning. The flow diagram represents the step of the algorithm. Before Convolution neural network algorithm, how the infections in the lung CT images are detected using the image processing techniques are given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

## II. RELATED WORK

The concept of detecting the disease using deep convolutional neural networks was introduced by Khalvati.F [1]. The developed an automatic CNN-based technique for sleuthing glandular carcinoma exploitation diffusion-weighted resonance imaging (DWI) collected from 427 patients. First-order applied mathematics options were extracted from slice-level possibilities, that were accustomed compile slice-level classification results into the patient level. A method for Molecular diagnostic technologies for COVID-19 proposed by Afzal A [2] This tactic has some drawbacks, as well as longer detection time and lower detection rate of the virus. Strict needs within the laboratory and numerous characteristics of the testing may well be attributed to the drawbacks. Researchers square measure engaged on overcoming the restrictions of RT-PCR testing to reinforce diagnosis and detection of the COVID-19. In [3], the authors did comparative research on analytics and study. In this paper, the most challenges square measure the identification of Coronavirus cases in blurred X-ray pictures and therefore the differentiation of those cases of COVID-19 from alternative respiratory disease cases, like MERS and respiratory illness, bearing in mind that they need a high degree of similarity. Second, the COVID-19 virus doesn't have a hard and fast form, circular, as an example, within the human tissue. Deep learning technique is used to classify the binary and multiple classes of corona virus using deep convolutional neural networks in [4]. In [5], the image processing technique is combined with the techniques of deep learning in x-ray images and a simple algorithm that links them. The technique is insensitive to noise, skew and text orientation.

## III. METHODOLOGY

This system has nice potential to be applied in assessing the designation, e.g., quantifying the infected regions, observance the longitudinal sickness changes, and mass screening process. machine-driven recognition of patterns in knowledge by computers supported information already obtained is named pattern recognition. It is applications in image analysis, info retrieval, signal process, knowledge compression, applied mathematics knowledge analysis, and machine learning. In machine learning approaches and applications, the convolutional neural network (CNN) structures demonstrate a high capability to extract and classify some key options and bridging the gap between the capabilities of machines and humans. The convolutional neural network rule can classify and observe the output by scrutiny the information. The information having the trained respiratory organ infection pictures and traditional respiratory organ pictures. If the respiratory organ infection is foreseen by this CNN rule so send email responsive to the user/doctor through Wi-Fi device.

## IV. EXPERIMENTAL RESULTS

The results of the proposed model can be analyzed as follows.

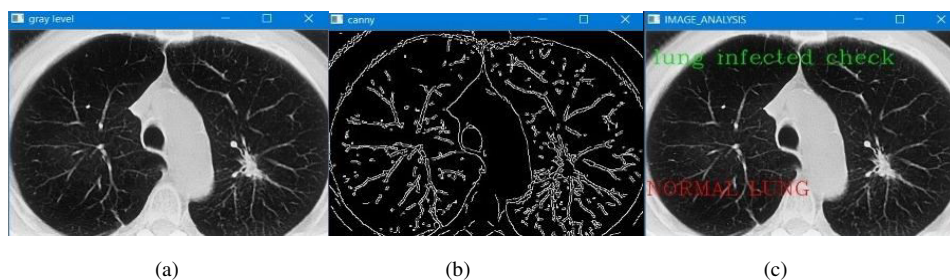


Fig. 2 Lung images (a) Input Image (b) Canny Edge detect (c) Output image

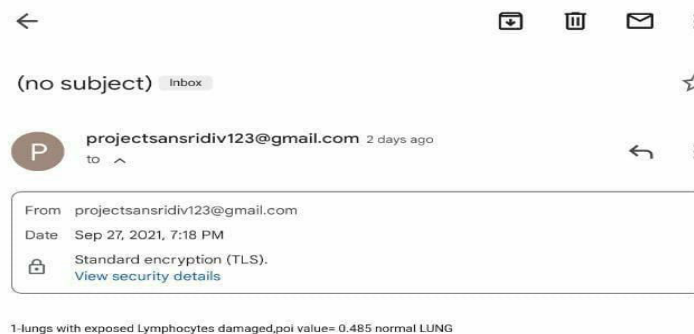
Figure 2 (a) shows the input image (Lung CT image) of the patient. (b) shows the image that uses canny edge detection method to detect the infected area in lungs which is marked in dark colour and unaffected area in white. (c) shows the output image concluding the infected area and the type of disease or infection.



```

C:\Users\Sreethi Rajendran\OneDrive\Desktop\output\ui_main_page\ui_main_page.exe
total classes images 11
['IP1', '2p2', 'n1', 'n3', 'n35', 'n4', 'Np1 (2)', 'NP1', 'p', 'p4', 'Thumbs']
11
1
image loading.....
segment start...
predicted output
stage tissue loss with exposed Lymphocytes damaged,R=2.55, P=0.201
poi: R=2.6555
COVID INFECTED
starts
mail id and password correct
mail Sent!
    
```

(a)



(b)

Fig.3 Verification (a) Output Screen (b) Email Alert

The Result of the system is directly sent as a mail alert to the user or doctor to perform further classifications.

### V. CONCLUSION

During this health emergency, it's vital that not even one positive case goes unidentified. The projected methodology is one in all the applications of deep learning that may be a convolutional neural network, designed to spot COVID-19 cases victimization respiratory organ CT pictures. The model has been trained and tested on a tiny low dataset of few pictures ready by getting CT pictures of varied respiratory disorder cases and COVID-19 cases from totally different publicly out there databases. CNN algorithmic rule is computationally less costly and achieved promising results on the ready dataset. Hence, the respiratory organ infection is foreseen simply associate degreed an email alert is shipped to the user/doctor directly.

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