ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

DEEP LEARNING FOR CLASSIFICATION AND LOCALIZATION OF COVID-19 MARKERS IN POINT-OF-CARE LUNG ULTRASOUND

G. Pradeepa[1], P. Yogalakshmi[2], S. Santhiya[2], M. Abitha[2]

Assistant Professor,Department of Information Technology,Vivekanandha college of Technology for women,Tiruchengode,Tamilnadu,India[1]

UG Students,Department of Information Technology,Vivekanandha College of Technology for Women,Tiuchengode,Nammakal (Dt),Tamilnadu,India[2]

ABSTRACT

Covid-19 is a rapidly spreading viral disease that infects not only humans, but animals are also infected because of this disease. The daily life of human beings, their health, and the economy of a country are affected due to this deadly viral disease. Covid-19 is a common spreading disease, and till now, not a single country can prepare a vaccine for COVID-19. A clinical study of COVID-19 infected patients has shown that these types of patients are mostly infected from a lung infection after coming in contact with this disease. Chest x-ray (i.e., radiography) and chest CT are a more effective imaging technique for diagnosing lunge related problems. Still, a substantial chest x-ray is a lower cost process in comparison to chest CT. Deep learning is the most successful technique of machine learning, which provides useful analysis to study a large amount of chest x-ray images that can critically impact on screening of Covid-19.This type have taken the PA view of chest x-ray scans for covid-19 affected patients as well as healthy patients. After cleaning up the images and applying data augmentation, we have used deep learning-based SVM models and compared their performance.

Key words: Covid-19 , Lung ct , Image processing , SVM

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

I.INTRODUCTION

The detection of coronavirus (COVID-19) is now a critical task for the medical practitioner. The coronavirus spread so quickly between people. It is very much essential to identify the infected people so that prevention of spread can be taken. The deep feature plus support vector machine (SVM) based methodology is suggested for detection of coronavirus infected patient using X-ray images. For classification, SVM is used instead of deep learning based classifier, as the later one need a large dataset for training and validation. The deep features from the fully connected layer of CNN model are extracted and fed to SVM for classification purpose. The SVM classifies the corona affected X-ray images from others. The methodology consists of three categories of X-ray images, i.e., COVID-19, pneumonia and normal.

The method is beneficial for the medical practitioner to classify among the COVID-19 patient, pneumonia patient and healthy people. SVM is evaluated for detection of COVID-19 using the deep features of different 13 number of CNN models. The deep features of CNN models are extracted from a particular layer and feature vector is obtained. The features are fed to the SVM classifier for classification of COVID-19, pneumonia patient and healthy people. The CNN is multilayer structure network, and each layer produces a response. The layers extract the essential image feature and pass to the next layer. The feature layer and feature vector used by CNN. The activation output is in the form of the column to fit in linear SVM training. To train the SVM, the function 'fit class error-correcting output codes is used. This function returns full trained multiclass error-correcting output of the model. The function uses K(K-1)/2, binary SVM model, using One-Vs-All coding design. Here, K is a unique class label.Because of error-correcting output codesand one-Vs-all coding design of SVM, the performance of classification models is enhanced.

II. RELATED WORK

Q. Liu Coronavirus is a recently distinguished sickness, which is extremely infectious and has been quickly spreading across various nations around the globe, calling for fast and exact determination devices. Chest CT imaging has been broadly utilized in clinical practice for infection conclusion, yet picture perusing is as yet a tedious work**.**

J. Wang et al a conceptually simple framework for fast COVID-19 screening in 3D chest CT images. The framework can efficiently predict whether or not a CT

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

scan contains pneumonia while simultaneously identifying pneumonia types between COVID-19 and Interstitial Lung Disease (ILD) caused by other viruses. In the proposed method, two 3D-ResNets are coupled together into a single model for the two above-mentioned tasks via a novel prior-attention strategy.

D. P. Fan et al Covid Disease 2019 (COVID-19) spread universally in mid 2020, making the world face an existential wellbeing emergency. Robotized identification of lung diseases from processed tomography (CT) pictures offers an extraordinary potential to increase the customary medical care procedure for handling COVID-19.The flare-up of the COVID-19 pandemic caused the passing of countless individuals.

X. Wang et a Precise and quick finding of COVID-19 presumed cases assumes a significant part in ideal isolate and clinical treatment. Building up a profound learning-based model for programmed COVID-19 analysis on chest CT is useful to counter the flare-up of SARS-CoV-2 **.**

M. J. Horry et al Distinguishing COVID-19 early may help in concocting a fitting treatment plan and illness regulation choices. In this investigation, we show how move gaining from profound learning models can be utilized to perform COVID- 19 recognition utilizing pictures from three most usually utilized clinical imaging modes X-Ray, Ultrasound, and CT check.

B. Zheng et al Since the principal understanding revealed in December 2019, 2019 novel Covid illness (COVID-19) has gotten worldwide pandemic with in excess of 10 million all out affirmed cases and 500 thousand related passings.

III. EXISTING SYSTEM

The outbreak of the COVID-19 pandemic caused the death of a large number of people. Millions of people are infected by this virus and are still getting infected day by day. As the cost and required time of conventional RT-PCR tests to detect COVID-19, researchers are trying to use medical images like X-Ray and Computed Tomography (CT) images to detect it with the help of Artificial Intelligence (AI) based systems. It can be reviewed some of these newly emerging AI-based models that can detect COVID-19 from medical images using X-Ray or CT of lung images. The analyzed datasets, preprocessing techniques, segmentation, feature

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

extraction, classification and experimental results which can be helpful for finding future research directions in the domain of automatic diagnosis ofCovid-19 disease using Artificial Intelligence (AI) based frameworks.Transfer learning shows significant difference in results when compared with the outcome from conventional classifications. It is obvious that we need not create separate model for classifying COVID-19 as done by conventional classifications. This makes the herculean work easier by using existing model for determining COVID-19. Second, it is difficult to detect the abnormal features from images due to the noise impedance from lesions and tissues.

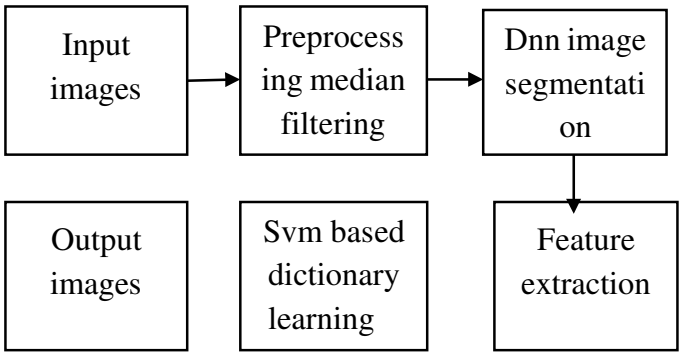
IV. PROPOSED SYSTEM

The deep feature plus support vector machine (SVM) based methodology is suggested for detection of coronavirus infected patient using X-ray images. For characterization, SVM is utilized rather than profound learning based classifier, as the later one need a huge dataset for preparing and approval.The deep features from the fully connected layer of CNN model are extracted and fed to SVM for classification purpose. The SVM classifies the corona affected X-ray images from others. The methodology consists of three categories of X-ray images, i.e., COVID-19, pneumonia and normal. K is a unique class label. Because of error-correcting output codes and one-Vs-all coding design of SVM, the performance of classification models is enhanced. The profound highlights of CNN models are removed from a specific layer and highlight vector is acquired. The highlights are taken care of to the SVM classifier for arrangement of COVID-19, pneumonia tolerant and solid individuals. The CNN is multilayer structure organization, and each layer delivers a reaction. The layers separate the fundamental picture highlight and pass to the following layer. The component layer and highlight vector utilized by CNN. The actuation yield is as the section to fit in straight SVM preparing. To prepare the SVM, the capacity 'fit class mistake adjusting yield codes is utilized. This capacity returns full prepared multiclass

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

mistake amending yield of the model. The capacity utilizes K(K-1)/2, twofold SVM model, utilizing One-Vs-All coding plan. Here, K is a remarkable class name. Due to mistake adjusting yield codes and one-Vs- all coding plan of SVM, the exhibition of grouping models is upgraded.

BLOCK DIAGRAM



ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

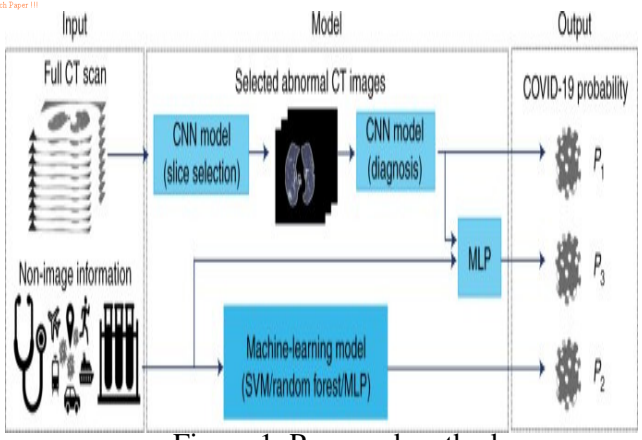


Figure 1. Proposed method

PREPROCESSING

Analyzing the image quantitatively, the scanned histology slides were preprocessed once with, once without image registration the satellite images in both cases. Image convolution was performed in after pre-processing to split the color image into channels. The channel image was used to generate a mask image, which separated the vessel sensitive region from the background. The median filter that uses the correlation of the image to process the features of the filtering mask over the image.

Step1:The pixels are read from the input images data's

Step2: The noise-reducing performance of the median filter

where V2i is input noise power (the variance), n is the size of the median filtering mask,)(nf is thewhere σ_i^2 is input noise power (the variance),in the size of the median filtering mask, $f \underset{(n)}{\rightarrow\rightarrow}$ is the function of the noise density.

$$\sigma_0^2 = \frac{1}{n}\sigma^2 \ldots (2)$$

Step 3: Improvement of the filtering mask. The filtering mask is mainly square mask or cross mask. Considering of the symmetry of the mask, n is commonly odd.

Step 4: The improved algorithm two improvements compared to the conventional median filtering algorithm.

Step 5: Comparative experiment among the standard median filtering algorithm, the fast median

Step 6: Filtering algorithm based on average and the improved algorithm in 10%, 35%, and 45% density impulse noises are respectively added to the original image of lung cancer.

Step 7: End image.

IMAGESEGMENTATION ALGORITHM

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

Discontinuities in the picture power can be either Step discontinuities, where the picture force unexpectedly changes from one incentive on one side of the irregularity to an alternate an incentive on the contrary side, or Line discontinuities, where the picture power suddenly changes esteem yet then re-visitations of the beginning an incentive inside some short distance. Notwithstanding, step and line edges are uncommon in genuine pictures. Step edges

become incline edges and line edges happen a limited distance. Where expected changes of discontinuities in a picture are called as edges.

FEATURE EXTRACTION

Morphology is a method by which the structure of shapes within an image could be cleaned up and studied. It works simply by comparing each pixel in the image against its neighbors in various ways, so that it adds or remove, brighten or darken that pixel. It is applied over a whole image, perhaps repetitively; specific shapes can be found, filtered and can be modified. Morphological operations are based on mathematical morphology, which can be used for removing isolated part of image with the help of algebraic non-linear operators. The segmented image is a binary image with road pixels labeled as 1's and non-road pixels as 0's. The morphological 'Clean' is used to remove isolated pixels such as binary 1's surrounded by 0's. For small hole filling, we first invert the segmented image. We then delete the small regions and invert this image.

This results in an image which has no small holes with road pixels as "1" and non-road pixels as "0". It is observed that the resulting image contains the non-road parts which can be filtered by using morphological filtering such as combination of opening and closing. After filtering there may be some discontinuity between the thinned detected roads due to noise. In order to connect broken segments' based on their relative orientation and distances morphological bridge is used to segment the unconnected pixels, that is, sets 0 valued pixels to 1 if they have two non-zero neighbors that are not connected.

V. EXPERIMENTAL SETUP

The proposed model has lesser bogus negative and bogus positive qualities.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

Along these lines, the proposed model can proficiently order the COVID-19 patients. Recipient working trademark (ROC) is a presentation estimation bend for grouping issue by considering number of limit esteems. It is characterized as a likelihood bend that characterizes the degree detachability between two classes such Corona virus .It assesses the exhibition of grouping models for recognizing Corona virus. Higher the ROC, better the arrangement model is at characterizing COVID-19 and the other way around. Figure 1 shows the acquired ROC of the proposed and serious grouping models. It obviously shows that the proposed model accomplishes great outcomes as contrasted and the serious models. Precision is processed by isolating the precisely ordered classes by absolute number of classes. It is an essential measure to register the exhibition of grouping issues. shows the exactness examination between the proposed what's more, serious grouping models. It plainly shows that the proposed model accomplishes fundamentally more precision as contrasted and the serious grouping models. By using SVM we achieved overall accuracy level of 98% whereas in existing methods 94% is achieved.

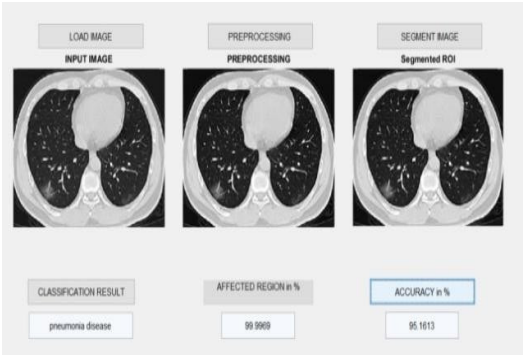


Figure 2. Affected Lung Image

Figure 3. Normal Lung Image

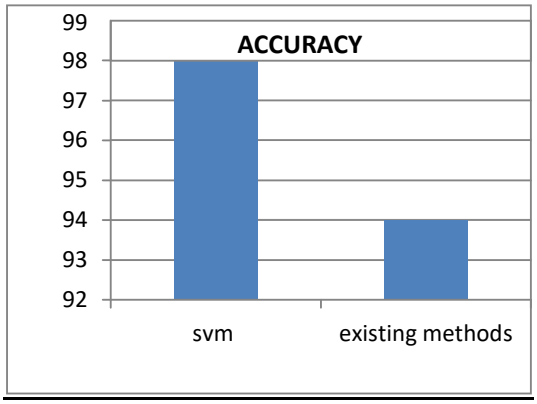


Figure 3. Accuracy Comparison

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

VI. CONCLUSION

The experimental evaluation of existing Deep CNN based image classification approaches is presented in order to identify COVID19 positive cases from chest CT scan images. Moreover, a decision fusion based approach is also proposed, which combines the predictions of each of the individual Deep CNN models, in order to improve the predictive performance. From the extensive experimentations, it is observed that the proposed approach can achieve very impressive results, with above in terms of every performance metric under consideration, while having a good reduction of the number of False Positives. From the experimental observations, it is clear that Deep CNN based approaches can potentially have a huge impact on the spread control of COVID19 by providing fast screening. With DL based approaches being used widely in other medical imaging tasks, it is high time for such approaches to be used in the screening process of the current pandemic as well.Only axial slices from CT images were used; however, it will be interesting to see how inclusion of other slices contributes to giving further information from the images. might give more reliable systems. For now, we consider these are th limitations of the used dataset and these limitations will be addressed in the future work.Furthermore, although the proposed approach shows great promise, there is still quite a bit of room for potentially improving the predictive performance of the approach. Recently, ideas like Transfer Learning, Image Augmentation, and Feature Level Fusion have been shown to boost the performance of DL based models drastically. These ideas are to be explored as part of the future work.

REFERENCE

[1] Q. Liu, C. K. Leung and P. Hu, "A Two-dimensional Sparse Matrix Profile DenseNet for COVID-19 Diagnosis Using Chest CT Images,"

[10] L. Meng et al., "A Deep Learning Prognosis Model Help Alert for COVID-19 Patients at High-Risk of Death: A Multi-focus Study," in IEEE Journal of Biomedical and Health Informatics.

[2] J. Wang et al., "Prior Attention Residual Learning for More Discriminative COVID-19 Screening in CT Images," in IEEE Transactions on Medical Imaging.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com
International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 7, Issue 4, April 2021

[3] D. - P. Fan et al., "Inf-Net: Automatic COVID-19 Lung Infection Segmentation From CT Images," in IEEE Transactions on Medical Imaging.

[4] X. Wang et al., "A Weakly-Supervised Framework for COVID-19 Classification and Lesion Localization From Chest CT," in IEEE Transactions on Medical Imaging.

[5] M. J. Horry et al., "Coronavirus Detection Through Transfer Learning Using Multimodal Imaging Data," in IEEE Access.

[6] B. Zheng et al., "MSD-Net: Multi-Scale Discriminative Network for COVID-19 Lung Infection Segmentation on CT," in IEEE Access.

[7] J. Liu, Z. Zhang, L. Zu, H. Wang and Y. Zhong, "Shrewd Detection for CT Image of COVID-19 utilizing Deep Learning," 2020 thirteenth International Congress on Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI).

[8] Y. Li et al., "Capable and Effective Training of COVID-19 Classification Networks With Self-Supervised Dual-Track Learning to Rank," in IEEE Journal of Biomedical and Health Informatics.

[9] R. G. Babukarthik, V. A. K. Adiga, G. Sambasivam, D. Chandramohan and J. Amudhavel, "Forecast of COVID-19 Using Genetic Deep Learning Convolutional Neural Network (GDCNN)," in IEEE Access.