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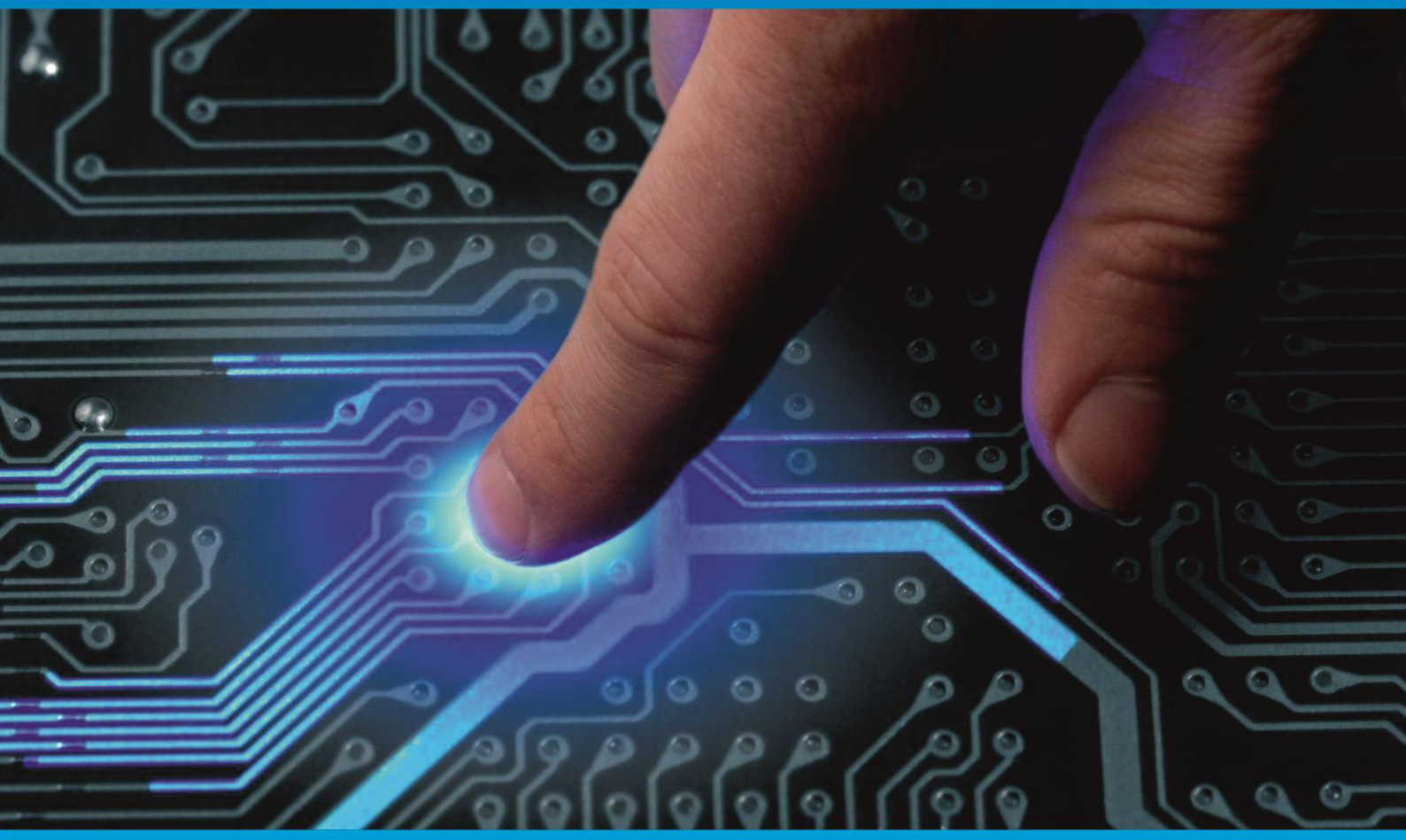

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Weakly-Supervised Network for Detection of COVID-19 in Chest CT Scans

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ABSTRACT: Covid-19 continues to have harmful effects on the lives of human beings throughout the world. In order to overcome the effects of this disease it is necessary to screen the affected patients in a fast and inexpensive way. One of the steps towards achieving this goal is through radiological examination, Chest X-Ray being the most easily available and least expensive option. we have proposed a Deep Convolutional Neural Network based solution which can detect the Covid-19 positive patients using chest X-Ray images. To test the efficiency of the solution we have used available chest X-ray images of Covid positive and negative cases. 538 images of Covid positive patients and 468 images of Covid negative patients have been divided into 771 trainable images and 235 testing images.Deep learning algorithm of CNN and LSTM are used to find the accuracy of the image data. Our solution gave a classification accuracy of 88.8% and sensitivity of 92% in the test set-up.

KEYWORDS: Deep Learning algorithm; CNN,LSTM; testing images; classification accuracy of images; test setup; radiological examination

I. INTRODUCTION

This infection is most commonly diagnosed by taking the CT scan of the patient. The risk of COVID-19 is immense for many, especially in developing nations where billions face energy poverty.The WHO estimates that over 4 million premature deaths occur annually from household air pollution-related diseases including COVID- 19.

People with infectious COVID-19 often have a productive cough, fever accompanied by shaking chills, shortness of breath, sharp or stabbing chest pain during deep breaths, and an increased rate of breathing. In elderly people, confusion may be the most prominent sign. The typical signs and symptoms in children under five are fever, cough, and fast or difficult breathing. Fever is not very specific, as it occurs in many other common illnesses and may be absent in those with severe disease, malnutrition or in the elderly.A cough is frequently absent in children less than 2 months old. More severe signs and symptoms in children may include blue-tinged skin, unwillingness to drink,ongoing vomiting, extremes of temperature, or a decreased level of consciousness. Lung diseases may refer to several types of disease that affect the pulmonary function inupper, middle, or lower lung regions.we have proposed a Deep Convolutional Neural Network based solution which can detect the Covid-19 positive patients using chest X-Ray images.We aim at processing CT scan images of chest to predict if the patient is diagnosed with COVID- 19.

This work investigates opportunities for applying machine learning solutions for automated detection and localization of COVID-19 on chest CT scan images. Chest CT scan image is consisting two various stages like, COVID and Non Covid. In COVID and Non COVID report consisting COVID- 19 patient grey scale images and Normal patient grey scale images. Chest CT scan images are usually used to identify the causes of patients' symptoms,includingthe classes of lung or heart disordersTo find the accuracy of COVID-19 patient based on COVID and Non COVID CT scan report. This report is classified by COVID-19 and Normal patient

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II. LITERATURE SURVEY

Title: Chronic Diseases and Health Monitoring Big Data: A Survey
Year: 2018

Author: RongHeng Lin , ZeZhou Ye , Hao Wang , Budan Wu.

Methodology

This survey has presented the historical and methodologies developed for the medical big data on chronic diseases and health monitoring. It provides an extensive overview of the medical big data technologies, applications and future works in over 100 publications. These 100 publications are chosen from 300 publications that we collected from recent big data research. During our literature collecting, we setup a literature tree which includes major stages of a complete big data processing. First layer of the tree nodes can become roots of the sub tree. Then we find out about 60 papers for each sub tree. After analyzing the connections between papers, we choose around 100 publications for this survey, which cover the whole life- cycle of the big data processing.

Advantage

- More efficient to detect large dataset of COVID-19.
- High performance of neural networks on COVID-19 identification.

Disadvantage

- It still takes a huge amount of time to train the network as you would have to classify 2000 regionproposals per image.
- It cannot be implemented real time as it takes around 47 seconds for each test image.

III. METHODOLOGY

A. Design Considerations*:*

- Data Selection and Loading
- Data Preprocessing
- Segmentation
- Feature Selection
- Classification
- Prediction
- Result Generation

B. Description of the design considerations*:*

The segmentation process is applied and detect the contour region of CT scan images and detect the COVID region. Then all the images are converted into array by dividing images with default dimension. In feature selection method we are going to split the data into training dataset and testing data set for classification

Step 1: Data Selection and Loading:

- The data selection is the process of selecting the data for COVID-19 chest CT scan image.
- In this project, COVID-19 chest CT scan image is used to find COVID- 19 and Normalpatient.
- The dataset which contains the information about chest CT scan image of COVID-19 and NonCOVID- 19.In three dataset contain COVID-19 and Normal patient CT scangrey scale image

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Step 2: Data preprocessing:

- It is the process of getting rescale data from the dataset. I.Resize image datasetII.Getting data
- Resize image dataset: Rescale the grey scale chest CT scan image size into 200. Getting data: That categorical data is defined as variables with a finite set of rescaled values. It requires array input and output variables

Step 3:Segmentation:

In digital image processing and computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as image objects). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyse. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

Step 4:Feature Selection

When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes.
Step 5:Classification:

It is type of recurrent neural network capable of learning order dependence in sequence prediction problems. This is a behaviour required in complex problem domains like machine translation, speech recognition and more.

Step 6:Prediction:

- It's a process of predicting the COVID-19 from the dataset.
- This project will effectively predict the data from dataset by enhancing the performance of the overall prediction results.

Step 7:Result Generation:

The Final Result will get generated based on the overall classification and prediction. The performance of this proposed approach is evaluated using certain measures and desired output is generated.

IV. RESULTS

```
In [2]: runfile('C:/Users/ISWARYA/Desktop/Source code/main.py', wdir='C:/Users/ISWARYA/
Desktop/Source code')
Number of images with COVID : 349
Number of images with NonCOVID : 195
2
2it [00:00, ?it/s]
CT_COVID -> 349
CT_NonCOVID -> 397
```

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Fig 1.Sample images

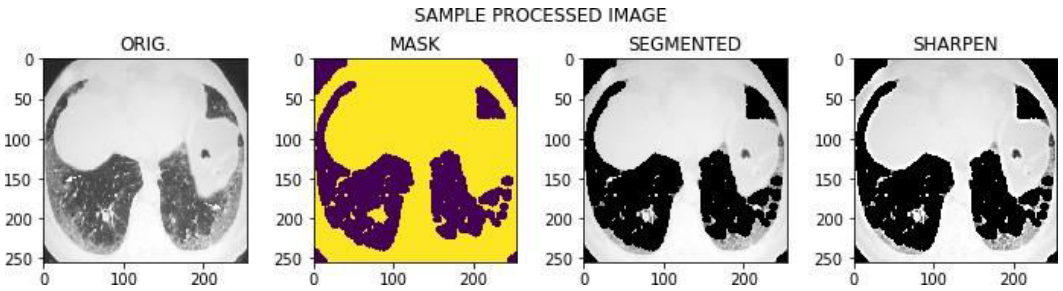

Fig 2..Sample Processed images

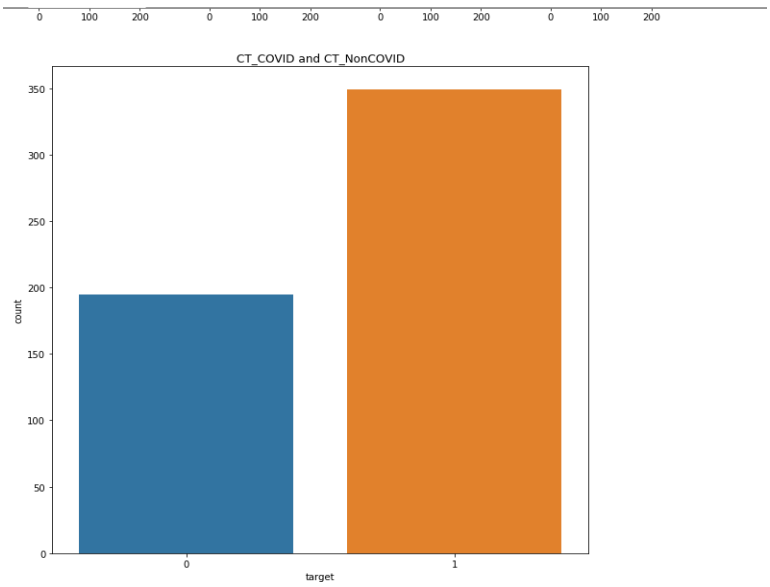

Fig 3.Prediction of covid and non covid images

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```
WARNING:tensorflow:From C:\ProgramData\Anaconda\lib\site-packages\tensorflow\python\ops
\init_ops.py:1251: calling VarianceScaling.__init__ (from
tensorflow.python.ops.init_ops) with dtype is deprecated and will be removed in a
future version.
Instructions for updating:
Call initializer instance with the dtype argument instead of passing it to the
constructor
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 195, 195, 32)      416
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 194, 194, 64)      8256
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 97, 97, 64)        0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 96, 96, 32)        8224
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 48, 48, 32)        0
_________________________________________________________________
flatten (Flatten)            (None, 73728)             0
_________________________________________________________________
dense (Dense)                (None, 32)                2359328
_________________________________________________________________
dense_1 (Dense)              (None, 1)                 33
=================================================================
Total params: 2,376,257
Trainable params: 2,376,257
Non-trainable params: 0
```

Fig 4. Classification of covid and non covid images

```
WARNING:tensorflow:From C:\ProgramData\Anaconda\lib\site-packages\tensorflow\python\ops
\nn_impl.py:180: add_dispatch_support.<locals>.wrapper (from
tensorflow.python.ops.array_ops) is deprecated and will be removed in a future version.
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
Train on 435 samples, validate on 109 samples
Epoch 1/5
435/435 [==============================] - 20s 46ms/sample - loss: 1.5746 - acc: 0.6000
- val_loss: 0.3938 - val_acc: 0.8532
Epoch 2/5
435/435 [==============================] - 20s 45ms/sample - loss: 0.3618 - acc: 0.8391
- val_loss: 0.2594 - val_acc: 0.9358
Epoch 3/5
435/435 [==============================] - 20s 46ms/sample - loss: 0.2040 - acc: 0.9310
- val_loss: 0.2171 - val_acc: 0.9266
Epoch 4/5
435/435 [==============================] - 21s 47ms/sample - loss: 0.0973 - acc: 0.9632
- val_loss: 0.2297 - val_acc: 0.8991
Epoch 5/5
435/435 [==============================] - 19s 45ms/sample - loss: 0.0353 - acc: 0.9977
- val_loss: 0.2566 - val_acc: 0.8807


109/109 [==============================] - 1s 12ms/sample - loss: 0.2566 - acc: 0.8807
Accuracy of the CNN is: 88.07339668273926 %
```

Fig 5. Desired Accuracy

V. CONCLUSION AND FUTURE WORK

Fast and timely detection of Covid positive patients are necessary to avoid spreading of the disease and keeping it in control. Our work has been done to detect the Covid positive patients from Chest X-Ray images in a simple and inexpensive way. In this work, three state-of-the-art deep learning models have been adopted.The proposed model has achieved a classification accuracy of 88.8%.Deep learning algorithm of CNN and LSTM are used to find the accuracy of the image data.

In feature, the fed with 2D FOC and IFS processes, the GRA-based classifier could improve the accuracy rate to separate “disease present” from “disease absent” and enable clinicians to respond for treatment actions. CADM

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development and to address the bottleneck in CT, GRA-based classifier could also train new medical images, such as CT imaging or high resolution magnetic resonance imaging, to enhance screening functions which could raise the accuracy rate and keep the intended medical purpose in medical devices or commercial off-the-shelf platforms for further clinical applications

REFERENCES

1. AnjumJohns Hopkins University. (2020). Coronavirus COVID-19 *Global Cases* by the Center for Systems Science and Engineering (CSSE). Accessed: Apr. 2, 2020. [Online]. Available: https://coronavirus.jhu.edu/map.html D. Planchard and B. Besse, "Lung cancer in never-smokers," Eur. Respiratory J., vol. 45, pp. 1214–1217,2015.
2. Centers for Disease Control and Prevention. (2020). Testing forCOVID-19. Accessed: Apr. 2, 2020. [Online]. Available: https://www. cdc.gov/coronavirus/2019- ncov/symptoms-testing/testing.html
3. T. Liang, ''Handbook of COVID-19 prevention and treatment,'' Zhejiang Univ. School Med., Hangzhou, China, Tech. Rep.,2020.
4. F. Pan, T. Ye, P. Sun, S. Gui, B. Liang, L. Li, D. Zheng, J.Wang,
5. R. L. Hesketh, L. Yang, and C. Zheng, ''Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia,'' *Radiology*, vol. 295, Feb. 2020, Art. no. 200370.
6. S. Salehi, A. Abedi, S. Balakrishnan, and A. Gholamrezanezhad, ''Coronavirus disease 2019 (COVID-19): A systematic review of imaging findings in 919 patients,'' Amer. J. Roentgenology, vol. 215, pp.1–7, Mar.2020.
7. Y.-H. Jin, L. Cai, Z. S. Cheng, H. Cheng, T. Deng, Y. P. Fan, C.Fang,
8. Huang, L. Q. Huang, Q. Huang, and Y. Han, ''A rapid advice guideline for the diagnosis and treatment of 2019 novel Coronavirus (2019-nCoV) infected pneumonia (standard version),'' Mil. Med.Res., vol. 7, no. 1, p. 4, 2020.
9. Y. Fang, H. Zhang, J. Xie, M. Lin, L. Ying, P. Pang, and W. Ji, ''Sensitivityof chest CT forCOVID-19: Comparison to RT-PCR,'' *Radiology*, vol. 296,no. 2, Feb. 2020, Art. no.200432.
10. F. Shi, J. Wang, J. Shi, Z. Wu, Q. Wang, Z. Tang, K. He, Y. Shi, and D. Shen,''Review of artificial intelligence techniques in imaging data acquisition,segmentation and diagnosis for COVID-19,'' 2020, *arXiv:2004.02731*.[Online]. Available:http://arxiv.org/abs/2004.02731
11. R. Lin, Z. Ye, H. Wang, and B. Wu, ''Chronic diseases and health monitoring big data: A survey,'' IEEE Rev. Biomed. Eng., vol. 11, pp. 275– 288,Apr.2018.
12. Mohammed, I. Farup, M. Pedersen, S. Yildirim, and Ø. Hovde, ''PSDeVCEM: Pathology- sensitive deep learning model for video capsule endoscopy based on weakly labeled data,'' Comput. Vis. Image Understand., 2020, Art. no.103062.

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