AN EFFICIENT NOVEL APPROACH ON DETECTION OF LUNG CANCER BASED ON COVID -19 MEDICAL DATA

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ABSTRACT: The incredible study of the medical health system is a widerange of computer systems to generate the latest innovations. These innovations are very important for the well-organized implementation of treatment systems that deal with the automatic diagnosis of health problems. The most important health tests can be obtained to predict cancer, which has different forms and can affect different parts of the body. According to the technical development and the latest trend taken into account, we decided to study the term biomedical, that is. lung cancer screening. Recently, COVID-19 has been severe in lung cancer patients (70% were hospitalized, 30% died). Although severe, COVID-19 accounted for a small proportion of all lung cancer deaths during the pandemic (11% in total). The determinants of COVID-19 severity are largely patient-specific characteristics, such as smoking and chronic obstructive pulmonary disease. People take many kinds of control measures such as social distancing, wearing masks, and quarantine if they are affected by the virus. Although they take precautions, most people are affected by the virus and also face fatal mortality. One of the most common symptoms of COVID-19 is a lung infection. If a person already has lung cancer, it has a greater effect if that person has the Covid virus. Existing research studies to detect covid-19 affect lung cancer using machine learning and deep learning algorithms with 2D and 3D X-ray images of the lungs, using the necessary algorithms addressed with less likely results. This is a challenging situation for researchers, scientists, and healthcare professionals. Researchers are making continuous efforts to obtain possible solutions to control this pandemic in their respective fields. In our system we offer distributed hadoop algorithms for deep learning like deepconvolutional neural network(CNN)and recurrent neural network(RNN) to detect and achieve maximum precision. In this particular system, we need to train each data set individually to make the prediction and test the effectiveness of the solution. we must use images based on CT-IMAGES Based on the CT image of each person for achieve maximum precision. The proposed methods have had a significant impact on the country as a whole as a warning to society. Therefore, the existence of such a hypothesis for innovative research will significantly reduce the incidence of lung cancer deaths affected by Covid-19 and will be addressed due to prior public advice.

Keywords *– Machine Learning & Deep Neural Network*

1. INTRODUCTION

Wuhan, China in December 2019.The disease has since spread throughout the world. Symptoms that lead to covid-19 are cough, headache, fatigue, breathing difficulties, loss of smell and taste. Symptoms may be visible from one to fourteen days after exposure to the virus. People who are infected do not quickly develop noticeable symptoms. And those who develop symptoms are classified as 81% develop mild to moderate symptoms, while 14% develop severe symptoms and 5% suffer critical symptoms. Old age people are at a higher risk of developing severe symptoms. Some people suffer a lot even after months of recovery and damage to organs. COVID-19 mainly spreads when people breathe contaminated air by droplets and small airborne particles that contains virus. The risk of breathing is highest when people are in close. Transmission can occur if physically contacted through contaminated fluids through eyes, nose or mouth and contaminated surfaces. People should remain isolatedfor minimum fourteen days and can come out of isolation if they don't get cured and do not develop any symptoms. Lung diseases, also known as respiratory diseases, are diseases of the airways and the other structures of the lungs . Examples of lung disease are pneumonia, tuberculosis and Coronavirus Disease 2019. Lung cancer disease has been privileged as one of the main factor in the more affect of covid-19. The COVID-19 has impacted the whole world infecting millions of people and burden the health .in this context we consider early detection and how much it affected Traditionally , lung disease can be detected by blood test ,chest X-ray ,skin test. Recently, deep learning has shown great potential when applied on medical images for disease detection, including lung disease. In this context of covid-19 lung cancer it will affect more on lungs.to screen this type of disease we have to verify the CT-images of every patient we have to acquire the patient data and we have to process the data of every patient and find out the risk factor. Using the machine learning algorithms we have to process the data of every patient using CNN ,RNN algorithms .using these particular algorithms we will classify the factors in the image and can calculate the risk factor.

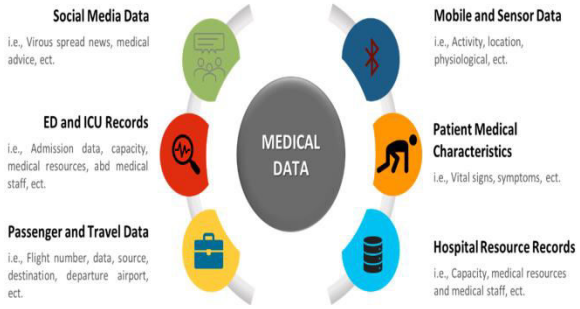


Fig.1: Example figure

2. LITERATURE REVIEW

A Survey of Deep Learning for Lung Disease Detection on Medical Images: State-of-the-Art, Taxonomy, Issues and Future Directions

The recent developments of deep learning support the identification and classification of lung diseases in medical images. Hence, numerous work on the detection of lung disease using deep learning can be found in the literature. This paper presents a survey of deep learning for lung disease detection in medical images. There has only been one survey paper published in the last five years regarding deep learning directed at lung diseases detection. However, their survey is lacking in the presentation of taxonomy and analysis of the trend of recent work. The objectives of this paper are to present a

taxonomy of the state-of-the-art deep learning based lung disease detection systems, visualise the trends of recent work on the domain and identify the remaining issues and potential future directions in this domain. Ninety-eight articles published from 2016 to 2020 were considered in this survey. The taxonomy consists of seven attributes that are common in the surveyed articles: image types, features, data augmentation, types of deep learning algorithms, transfer learning, the ensemble of classifiers and types of lung diseases. The presented taxonomy could be used by other researchers to plan their research contributions and activities. The potential future direction suggested could further improve the efficiency and increase the number of deep learning aided lung disease detection applications.

COVID-19 and the multidisciplinary care of patients with lung cancer: an evidence-based review and commentary

Delivering lung cancer care during the COVID-19 pandemic has posed significant and ongoing challenges. There is a lack of published COVID-19 and lung cancer evidence-based reviews, including for the whole patient pathway. We searched for COVID-19 and lung cancer publications and brought together a multidisciplinary group of stakeholders to review and comment on the evidence and challenges. A rapid review of the literature was undertaken up to 28 October 2020, producing 144 papers, with 113 full texts screened. We focused on new primary data collection (qualitative or quantitative evidence) and excluded case reports, editorials and commentaries. Following exclusions, 15 published papers were included in the review and are summarised. They included one qualitative paper and 14 quantitative studies (surveys or cohort studies), with a total of 2295 lung cancer patients data included (mean study size 153 patients; range 7–803). Review of current evidence and commentary included awareness and help-seeking; lung cancer screening; primary care assessment and referral; diagnosis and treatment in secondary care, including oncology and surgery; patient experience and palliative care. Cross-cutting themes and challenges were identified using qualitative methods for patients, healthcare professionals and service delivery, with a clear need for continued studies to guide evidence-based decision-making.

Diagnosis of COVID-19 using CT scan images and deep learning techniques

Early diagnosis of the coronavirus disease in 2019 (COVID-19) is essential for controlling this pandemic. COVID-19 has been spreading rapidly all over the world. There is no vaccine available for this virus yet. Fast and accurate COVID-19 screening is possible using computed tomography (CT) scan images. The deep learning techniques used in the proposed method is based on a convolutional neural network (CNN). Our manuscript focuses on differentiating the CT scan images of COVID-19 and non-COVID 19 CT using different deep learning techniques. A self-developed model named CTnet-10 was designed for the COVID-19 diagnosis, having an accuracy of 82.1%. Also, other models that we tested are DenseNet-169, VGG-16, ResNet-50, InceptionV3, and VGG-19. The VGG-19 proved to be superior with an accuracy of 94.52% as compared to all other deep learning models. Automated diagnosis of COVID-19 from the CT scan pictures can be used by the doctors as a quick and efficient method for COVID-19 screening.

Quantitative Lung Computed Tomography Image Feature for Multi-Center Severity Assessment of COVID-19

The COVID-19 pandemic has affected millions and congested healthcare systems globally. Hence an objective severity assessment is crucial in making therapeutic decisions judiciously. Computed Tomography (CT)-scans can provide demarcating features to identify severity of pneumonia —commonly associated with COVID-19—in the affected lungs. Here, a quantitative severity assessing chest CT image feature is demonstrated for COVID-19 patients. We incorporated 509 CT images from 101 diagnosed and expert-annotated cases (age 20-90, 60% males) in the study collected from a multi-center Italian database1 sourced from 41 radio-diagnostic centers. Lesions in the form of opacifications, crazy-paving patterns, and consolidations were segmented. The severity determining feature —Lnorm was quantified and established to be statistically distinct for the three —mild, moderate, and severe classes (p-value<0.0001). The thresholds of Lnorm for a 3-class classification were determined based on the optimum sensitivity/specificity combination from Receiver Operating Characteristic (ROC) analyses. The feature Lnorm classified the cases in the three severity categories with 86.88% accuracy. 'Substantial' to 'almost-perfect' intra-rater and inter-rater agreements were achieved involving expert (manual segmentation) and non-expert (graph-cut and deep-learning based segmentation) labels (κ-score 0.79-0.97). We trained several machine learning classification models and showed Lnorm alone has a superior diagnostic accuracy over standard image intensity and texture features. Classification accuracy was further increased when Lnorm was used for 2-class classification i.e. to delineate the severe cases from non-severe ones with a high sensitivity (97.7%), and specificity (97.49%). Therefore, key highlights of the COVID-19 severity assessment feature are high accuracy, low dependency on expert availability, and wide utility across different CT-imaging centers.

Deep CNN models for predicting COVID-19 in CT and x-ray images

Coronavirus disease 2019 (COVID-19) is a new infection that has spread worldwide and with no automatic model to reliably detect its presence from images. We aim to investigate the potential of deep transfer learning to predict COVID-19 infection using chest computed tomography (CT) and x-ray images. Approach: Regions of interest (ROI) corresponding to ground-glass opacities (GGO), consolidations, and pleural effusions were labeled in 100 axial lung CT images from 60 COVID-19-infected subjects. These segmented regions were then employed as an additional input to six deep convolutional neural network (CNN) architectures (AlexNet, DenseNet, GoogleNet, NASNet-Mobile, ResNet18, and DarkNet), pretrained on natural images, to differentiate between COVID-19 and normal CT images. We also explored the model's ability to classify x-ray images as COVID-19, non-COVID-19 pneumonia, or normal. Performance on test images was measured with global accuracy and area under the receiver operating characteristic curve (AUC).

3. METHODOLOGY

Existing research studies to detect covid-19 affect lung cancer using machine learning and deep learning algorithms with 2D and 3D X-ray images of the lungs, using the necessary algorithms addressed with less likely results.

In the existing system we use 3D and 2D X-ray images for processing the data .In our system we will be using CT-images instead of X-rays. We will be using a machine learning algorithms and process the data of the image data sets. This system helps us to advice the people about the risk factor of covid-19 during lung cancer. Based on the CT-images we can achieve maximum precision based on the CT-images.

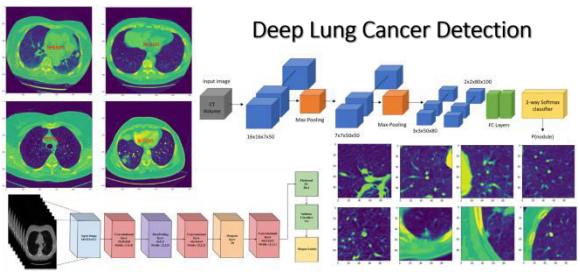


Fig.2: System architecture

Healthcare:

Deep learning in healthcare is on the rise and is solving a variety of problems for overall healthcare industry. Research has shown that Deep Neural Networks can be trained to produce radiological findings with high reliability by training from archives of millions of patient scans collected by healthcare systems. These advancements will change the health and personal care scenario by replacing doctors with AI expert systems and autonomous robot surgeons.

Artificial Neural Network(ANN):

Artificial Neural Network is a network in which artificial neurons are interconnected. Here each neuron represents information processing unit. These nodes pass information to each other so that they can mimic human brain. The nodes interact with each other and can also share information. Each node takes input and performs some operation namely summation function and activation function. It takes input from input layer then send the information to hidden layer, here operations are done and finally the output of hidden layer is sent to output layer.

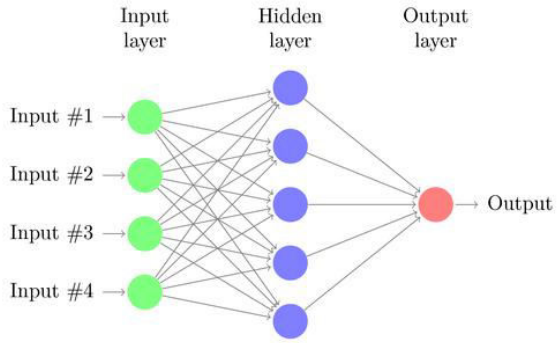


Fig.3: ANN model

The links between nodes are weighted. These weights should be adjusted based on the performance. If the performance is high, then weights are not adjusted. And if performance is low, then weights are adjusted through specific calculation. The layer in left is called as input layer and layer towards right is called the output layer. And the layers present between input and output layers are called hidden layers.

ANNs used for Deep Learning:

1. Convoluted Neural Network: Convoluted Neural Networks are like ordinary Neural Networks but their architecture is designed for images as input. The layers of a ConvNet have neurons arranged in 3 dimensions as width, height, depth. They are suitable for spatial data, object recognition and image analysis using multidimensional neurons structures. One of the main reasons for the popularity of the deep learning is due to Convoluted Neural Networks. Some of the applications of Convoluted Neural

Networks are self-driving cars, drones, computer vision and text analytics.

2. Recurrent Neural Networks: RNNs are also a feedforward network with recurrent memory loops. RNN takes the input from the previous or same layers. Here connections form a directed graph. In simple termsthe network maintains a memory up till that moment and can predict the next action.Long Short Term Memory (LSTM) network is the most common types of RNN model. RNNs are used in grammar learning and work prediction.

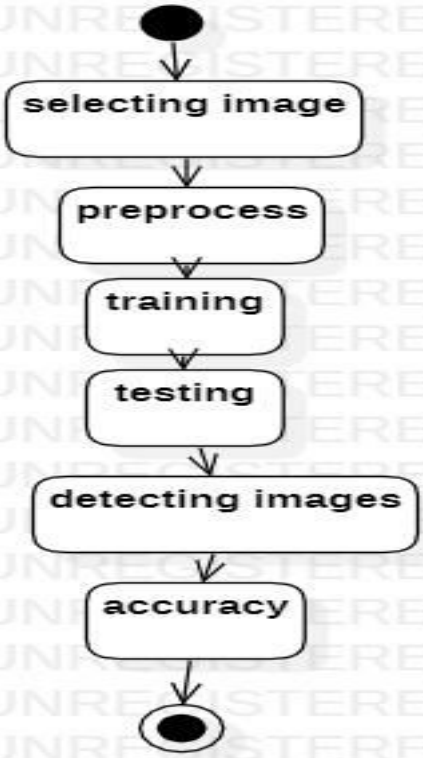


Fig.4: Dataflow diagram

4. DEEP LEARNING

Deep learning is a subset of Machine learning that is continuously changing the world. Right from driverless cars to speech recognition, it is making everything possible. This has become a hot topic of Industry and is affecting all Industries related to Machine Learning and Artificial Intelligence. Learning can be classified as supervised, semi-supervised and unsupervised. It's a branch of Machine Learning and can be implemented using large Artificial Neural Networks greater than 100 layers. Training ANNs for deep learning requires lots of labeled data and huge computing power. The deep refers to the hundreds of hidden layers of Artificial Neural Networks that is used in deep learning. There are different types of ANNs. It has improved significantly in terms of accuracy and is still evolving.

5. EXPERIMENTAL RESULTS

PROCESSING STEPS:

- First we have to execute the packages
- After executing the packages we have to process the data sets
- Based on images data sets we have to classify the data model into training data and testing data
- After the training we will classify the data and we will get an accuracy of 82.1%

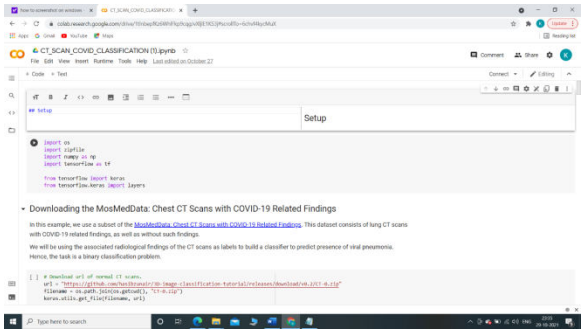
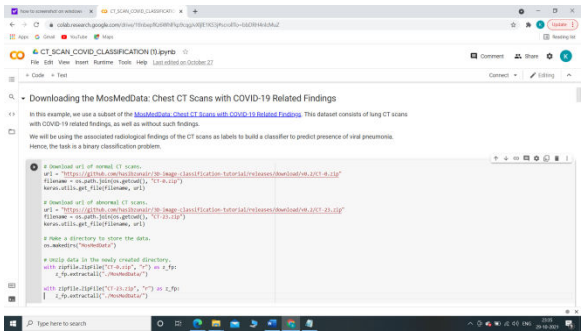


Fig.5: OUTPUT



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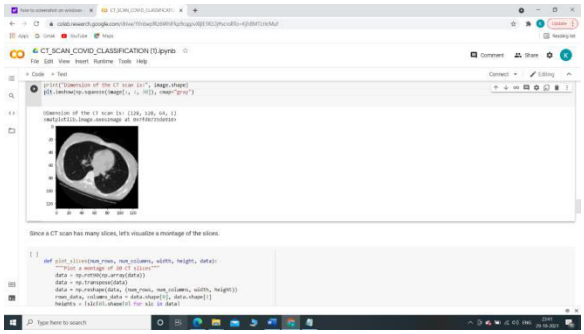

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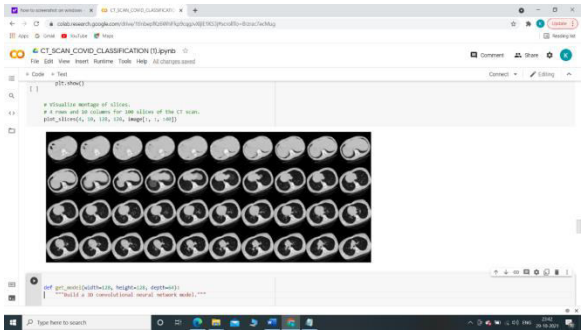

Fig.8: OUTPUT

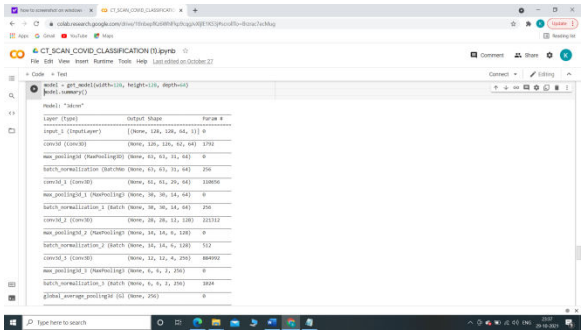

Fig.9: OUTPUT

6. CONCLUSION

In this project, I have used deep learning techniques and python libraries to identify the risk factor based on the CT-images, we will be using the machine learning model and deep learning models we will be using image data sets based on the that images we will be analysing the risk factor of data sets we will get maximum precision.

7. FUTURE WORK

This project may be implemented based on the larger data sets in future enhancements by using the better algorithms we can process the larger data sets and we can easily process the data of the people. So, we can advise the people about the risk factor of the lung cancer during the covid-19 and we can aware the people about the necessary precautions based on covid-19.

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