LUNG DISEASE PREDICTION USING MOBILENET DEEP TRANSFER LEARNING

POKURI VENKATA RADHAKRISHNA MURTY[1], T. RAJESH [2]

[1]Assoc. Professor, Dept of MCA, Audisankara College of Engineering and Technology (AUTONOMOUS), Gudur, AP, India.

[2]PG Scholar, Dept of MCA, Audisankara College of Engineering and Technology (AUTONOMOUS), Gudur, AP, India.

ABSTRACT – The field of computer science known as machine learning explores algorithms that learn from examples. Classification requires machine learning algorithms that understand how to apply a class label to data from the problem area. An easy-to-understand example is categorizing emails as "spam" or "not spam." Binary classification predicts one of two classes, whereas multi-class classification predicts one of several classes. In most binary classification tasks, there is one type of normal state and another type of aberrant state. This Project involves how lung disease prediction using x-ray images will predict through the binary classification model implemented, and various python libraries like Tensor Flow, Keras, NumPy, etc. are used. This research project will observe the prediction of lung diseases by using x-ray images and further the output will be predicted with the detailed example and a detailed source code. The implementation will be shown step by step with possible screenshots.

Index terms – Deep Learning, Lung Disease detection, CNN, MobileNet.

I. INTRODUCTION

The technological development trend in software engineering has been improving, where the design of software began move from the desktop to the web. Nowadays, many IDE (Integrated Development Environment) application has been made, such as Eclipse, Visual Studio, etc. but IDEs which based on desktop still have significant disadvantages such as long time for configuration and installing the plug-in needed for IDE to run the project. This problem could be a huge waste of time when there are many devices that have to be configured Many software applications have been run in the cloud, and use a web browser as a user interface that allows ubiquitous access, instant collaboration, and avoid installation and configuration on desktop computers one of the technologies used for

instant collaboration is single IDE (like pair programming) Pair programming is the practice of having two programmers' access and work on the same code in a single development environment in pair programming programmers have the abilities to create, edit and delete source code in real time. Therefore, it needs to make an application that can improve performance while writing program such as real-time collaboration, create, execute and display the result of the program using terminal. Online compiler that is development environment save lot of time as well as user can access it from any device without installing ide and other requirement. Coide is designed for coding practice and improvement, Coide offers code challenges and courses aimed at helping you prepare for job interviews. Coide provides more than 50+ practice problems to its programmer community. Individual challenges in topics like algorithms, database structures, and dynamic programming accompany entire study plans. The server based code editor is used to run multiple programming languages, many programmers who want to edit the source code urgently might not access convenient resource without installing any application on the computer or notebook in our project programmer can compile and run source code via web browser and the code will be done at the server side. Then the output from the compilation will be displayed at the browser of client side. server based code editor provides facility to run on the small resources such as pc's, tabs, androids, notebook's and laptops. programmers need to have atleast one computer in order to edit program source code. if programmer wants to run multiple languages then the programmer needs to install the software of that particular languages but by using server based code editor if programmer wants to run multiple programming languages then they can run all languages in one platform means server based code editor provider same platform for multiple programming languages that's why programmer doesn't need to install software of that particular programming languages which they to enter a program language source statements or to create a documents such as technical manuals.

II. LITERATURE SURVEY

Prediction of Pneunonia Using Big Data Deep Learning and Machine Learning Techniques

Using big data for prediction analysis along with machine learning or deep learning techniques or algorithms is one the most active areas of research in order to improve

the health and the medical science. There is a significant increase in the size of the medical data as well as the complexity in the diagnosis of various diseases. With this being said, the diagnosis or the prediction of many terminal or fatal diseases has seen huge success through deep learning. Among those fatal diseases, pneumonia is one of the greatest threats to the life of a man affecting the lungs leading to lung failure. To diagnose a man with pneumonia, the x-ray of chest is needed, and an expert in the prediction is also required. Hence, it is more convenient to build an automated predictor to predict the pneumonia using the big data deep learning methods. Among all the other techniques, CNN (Convolutional Neural Networks) stand tall and high in this prediction along with other classifiers. Also, pre-training the CNN models for very large datasets that is for big data of healthcare units stands a high chance for accurate classification. A CNN model which is pre-trained along with an efficient feature extraction technique and various classifiers to classify the positive from negative is considered to give highly accurate results. This research work represents the Prediction of Pneumonia using Big Data, Deep Learning and Machine Learning Techniques.

COVID-19 Chest X-Ray Image Classification Using Deep Learning

The rise of the coronavirus disease 2019 (COVID-19) pandemic has made it necessary to improve existing medical screening and clinical management of this disease. While COVID-19 patients are known to exhibit a variety of symptoms, the major symptoms include fever, cough, and fatigue. Since these symptoms also appear in pneumonia patients, this creates complications in COVID-19 detection especially during the flu season. Early studies identified abnormalities in chest X-ray images of COVID-19 infected patients that could be beneficial for disease diagnosis.

Therefore, chest X-ray image-based disease classification has emerged as an alternative to aid medical diagnosis. However, manual detection of COVID-19 from a set of chest X-ray images comprising both COVID-19 and pneumonia cases is cumbersome and prone to human error. Thus, artificial intelligence techniques powered by deep learning algorithms, which learn from radiography images and predict presence of COVID-19 have potential to enhance current diagnosis process. Towards this purpose, here we implemented a set of deep learning pre-trained models such as ResNet, VGG, Inception and EfficientNet in conjunction with developing a computer vision AI system

based on our own convolutional neural network (CNN) model: Deep Learning in Healthcare (DLH)-COVID. All these CNN models cater to image classification exercise. We used publicly available resources of 6,432 images and further strengthened our model by tuning hyperparameters to provide better generalization during the model validation phase. Our final DLH-COVID model yielded the highest accuracy of 96% in detection of COVID-19 from chest X-ray images when compared to images of both pneumonia-affected and healthy individuals. Given the practicality of acquiring chest X-ray images by patients, we also developed a web application (link: https://toad.li/xray) based on our model to directly enable users to upload chest X-ray images and detect the presence of COVID-19 within a few seconds. Taken together, here we introduce a state-of-the-art artificial intelligence-based system for efficient COVID-19 detection and a user-friendly application that has the capacity to become a rapid COVID-19 diagnosis method in the near future.

Classification of COVID-19 CT Images using Transfer Learning Models

Background and objective: SAARS-COV-2 is a respiratory illness caused by the novel Coronavirus (COVID-19) disease. The virus goes into the lungs through the respiratory tracks and damages the walls and linings of the air sacs in our lungs, as our body tries to fight it, our lungs become more inflamed and fill with fluid. This makes it harder to breathe. So, at early stages, deep learning applications can be used for screening and prediction at a rapid rate for diagnosing the lungs of patients. This paper uses Transfer learning methods.

Four pretrained models were used in this study - VGG-16, VGG-19, Inceptionv3, Xception This paper addresses challenges while using pre-trained models in real-world. Also, high accuracies were achieved on these models.

FVC-NET: An Automated Diagnosis of Pulmonary Fibrosis Progression Prediction Using Honeycombing and Deep Learning

Pulmonary fibrosis is a severe chronic lung disease that causes irreversible scarring in the tissues of the lungs, which results in the loss of lung capacity. The Forced Vital Capacity (FVC) of the patient is an interesting measure to investigate this disease to have the prognosis of the disease. This paper proposes a deep learning-based FVC-Net architecture to predict the progression of the disease from the patient's computed tomography (CT) scan and the patient's metadata. The input to the model combines the image score

generated based on the degree of honeycombing for a patient identified based on segmented lung images and the metadata. This input is then fed to a 3-layer net to obtain the final output. The performance of the proposed FVC-Net model is compared with various contemporary state-of-the-art deep learning-based models, which are available on a cohort from the pulmonary fibrosis progression dataset. The model showcased significant improvement in the performance over other models for modified Laplace Log-Likelihood (−6.64). Finally, the paper concludes with some prospects to be explored in the proposed study.

COVID-19 detection based on hug CT scan using deep learning techniques

SARS-CoV-2 is a novel virus, responsible for causing the COVID-19 pandemic that has emerged as a pandemic in recent years. Humans are becoming infected with the virus. In 2019, the city of Wuhan reported the first-ever incidence of COVID-19. COVID-19 infected people have symptoms that are related to pneumonia, and the virus affects the body's respiratory organs, making breathing difficult. A real-time reverse transcriptase-polymerase chain reaction (RT-PCR) kit is used to diagnose the disease. Due to a shortage of kits, suspected patients cannot be treated promptly, resulting in disease spread. To develop an alternative, radiologists looked at the changes in radiological imaging, like CT scans, that produce comprehensive pictures of the body of excellent quality.

III. PROPOSED WORK

In this proposed model, first the x-ray scan image is pre-processed and the ROI (region of interest) is separated in preparation for segmentation.[17] At the segmentation stage, feature extraction algorithm is applied and the feature is such as correlation, entropy, variance, contrast, dissimilarity and energy. After the feature extraction stage, classification is carried out by an CNN model for classification of lung disease. The proposed system is shown in the below figure.

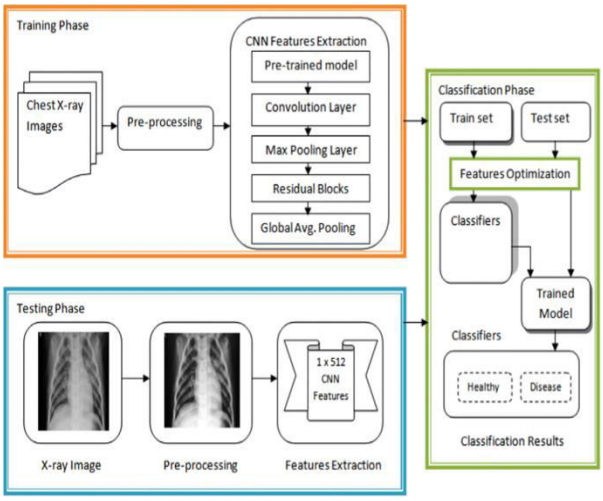

Fig. 1: System Overview

Implementation Modules

Load Dataset

- In this phase, load x-ray images .zip dataset into program and extract the signature images from .zip file.
- This data can be analyzed and extract the best features to preprocess the data**.**

Data Augmentation

- Data Augmentation is the process of increasing the size of the data set. There are ways in which the process is done by rotating, flipping, shearing, and adding random noise, along with other types.
- The new images in the dataset will help in training the network as well as increasing the efficiency of classifying the testing data or the new data.

Preprocessing

- In this module, we pre-process the image data and convert the image data into numpy array data. This step is very important to identify the feature of the image data. This extracted features are show as array data and size can be represented as (733, 128, 128, 3).

Train Model

- In this module, after spilt data as train and test data in the ratio of 80% and 20% respectively. The train data can be used for train the model and the test data can be used for test the model performance. In this project we applied CNN Model and to train the model we are using fit() method in python programming.

Classification

- In this module, we used our proposed model to classify lung disease.

Evaluate Model

In this module, we construct and calculate confusion matrix and classification metrics to further evaluate the models.

Implementation Algorithm

CNN

In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of artificial neural network (ANN), most commonly applied to analyze visual imagery.

CNNs are also known as Shift Invariant, based on the shared-weight architecture of the convolution kernels or filters that slide along input features and provide translation-equivariant responses known as feature maps.

MobileNet

MobileNet is TensorFlow's first mobile computer vision model. It uses depthwise separable convolutions to significantly reduce the number of parameters compared

to other networks with regular convolutions and the same depth in the nets. This results in lightweight deep neural networks.

MobileNet is a class of convolutional neural network (CNN) that was open-sourced by Google, and therefore, provides an excellent starting point for training classifiers that are insanely small and insanely fast.

The speed and power consumption of the network is proportional to the number of multiply-accumulates (MACs) which is a measure of the number of fused multiplication and addition operations.

IV. RESULTS

Fig. 2: Home Page

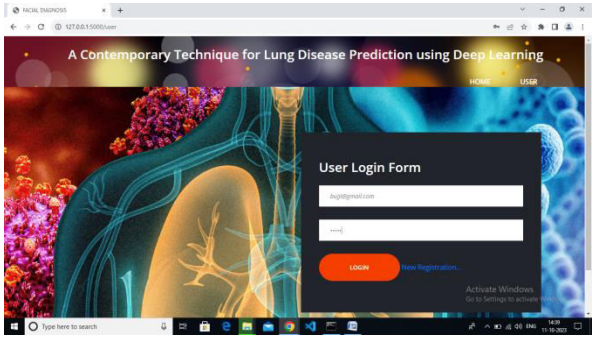

Fig. 3: Login Page

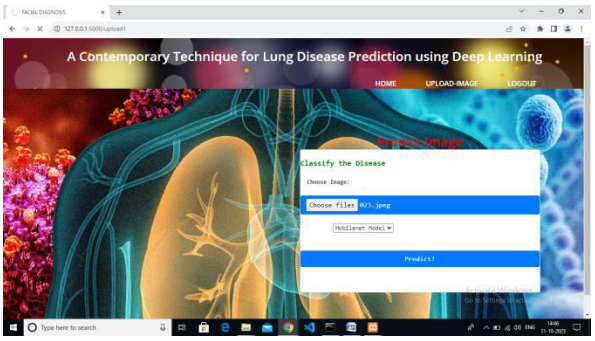

Fig. 4: Upload Image

Fig. 5: Classify the Disease

V. CONCLUSION

As time goes on, more works on lung disease detection using deep learning have been published. However, there was a lack of systematic survey available on the current state of research and application. This paper is thus produced to offer an extensive survey of lung disease detection using deep learning, specifically on tuberculosis, pneumonia, lung cancer and COVID-19, published from 2016 to September 2020. In total, 98 articles on this topic were considered in producing this survey. To summarise and provide an organisation of the key concepts and focus of the existing work on lung disease detection

using deep learning, a taxonomy of state-of-the-art deep learning aided lung disease detection was constructed based on the survey on the works considered. Analyses of the trend on recent works on this topic, based on the identified attributes from the taxonomy, are also presented. From the analyses of the distribution of works, the usage of both CNN and transfer learning is high.

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AUTHORS

Mr. Pokuri Venkata Radhakrishna Murty, He was Completed his Masters of Technology in Computer Science and Engineering. He is dedicated to teaching filed from the last 17 years. Currently Working as an Associate Professor in the Department of CSE at ASCET (AUTONOMOUS), Gudur, Tirupathi (DT). His areas of interest include Data Mining, Cloud Computing and Machine Learning.

T. Rajesh has Pursuing his MCA from Audisankara College of Engineering and Technology (AUTONOMO-US), Gudur, affiliated to JNTUA in 2023. Andhra Pradesh, India