Section A-Research paper

COVID, PNEUMONIA OR NORMAL X-RAY IMAGES CLASSIFICATION BY USING A NEURAL NETWORK

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ABSTRACT: The current global Covid-19 pandemic is related to an acute respiratory disease caused by a new coronavirus (SARS-CoV-2), which is highly contagious and whose evolution is still little known. Considering the current case definition, based on the diagnosis of pneumonia, more than 100,000 cases of Covid-19 infection have been confirmed worldwide, and the associated mortality rate has fluctuated around 2%. Currently, available laboratory tests might not be widely accessible to a growing infected population, but new screening strategies are necessary. Chest CT as a screening tool has yet to be determined, recent studies have demonstrated a central role of CT in the early detection and management of Covid-19 pulmonary manifestations. It has shown high sensitivity but limited specificity. We present a Neural Network in TensorFlow and Keras based on Covid-19 and Pneumonia classification. The proposed system is based on CNN using images to classify, Covid-19 or Pneumonia in this system using the CNN model. It is predicted that the success of the obtained results will increase. If the CNN method is supported by adding extra feature extraction methods and images to classify successfully by covid-19 or Pneumonia.

1. INTRODUCTION

Treatments you might receive include: Antiviral medications: Certain antiviral medications, like remdesivir or Paxlovid, specifically target the virus the causes COVID-19 and help you fight off the infection. Antibiotics: Antibiotics are used to treat bacterial pneumonia. The FDA has approved the antiviral drug remdesivir (Veklury) to treat COVID-19 in hospitalized adults and children who are age 12 and older in the hospital. Remdesivir may be prescribed for people who are hospitalized with COVID-19 and need supplemental oxygen or have a higher risk of serious illness.

2. LITERATURE SURVEY

[1]Coronavirus disease (COVID-19) is a pandemic disease, which has already caused thousands of causalities and infected several millions of people worldwide. Any technological tool enabling rapid screening of the COVID-19 infection with high accuracy can be crucially helpful to the healthcare professionals. The main clinical tool currently in use for the diagnosis of COVID-19

is the Reverse transcription polymerase chain reaction (RT-PCR), which is expensive, less-sensitive and requires specialized medical personnel. X-ray imaging is an easily accessible tool that can be an excellent alternative in the COVID-19 diagnosis. This research was taken to investigate the utility of artificial intelligence (AI) in the rapid and accurate detection of COVID-19 from chest X-ray images. The aim of this paper is to propose a robust technique for automatic detection of COVID-19 pneumonia from digital chest X-ray images applying pre-trained deep-learning algorithms while maximizing the detection accuracy. A public database was created by the authors combining several public databases and also by collecting images from recently published articles.

[2] Pneumonia type recognition algorithms includetemplate-matching method and statistical pattern-based recognition method . Statistical pattern-based recognition methods include support vector machine, the Adaboost algorithm, deep learning methods, and so on. Although there are many algorithms in the field of pneumonia image recognition nowadays, the most widely used one is the statistical-based recognition algoritm . This kind of algorithm needs to established standard sample library, and then train the classifier by extracting sample features and using machine learning method to complete the target recognition. This kind of algorithm has better robustness than template matching algorithm. Support Vector Machine (SVM) is a learning algorithm based on the principle of structural risk minimization and VC dimension theory. Its basic model is to find the linear classifier with the largest classification interval in feature space . That is to say,the learning strategy of SVM is to maximize the interval and can eventually be transformed into aconvexquadraticc programming problem to solve it. Bextractingthe he texture features of lung LBP, Kaao uses support vector machine algorithm to identify lung types, and achieve side results . Futher more, Adaboostalgorithm the effect of strong classifier by combining weak classifiers. It is an iterative algorithm. Its main idea is to train different weak classifiers with the same training set, and then combine the weak classifiers according to the weight ratio to form a strong classifier.

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[4] bstract—Trend prediction of influenza and the associated pneumonia can provide the information for taking preventive actions for public health. This paper uses meteorological and pollution parameters, and acute upper respiratory infection (AURI) outpatient number as input to multilayer perceptron (MLP) to predict the patient number of influenza and the associated pneumonia in the following week. The meteorological parameters in use are temperature and relative humidity, air pollution parameters are Particulate Matter 2.5 (PM 2.5) and Carbon Monoxide (CO), and the patient prediction includes both outpatients and inpatients. Patients are classified by tertiles into three categories: high, moderate, and low volumes. In the nationwide

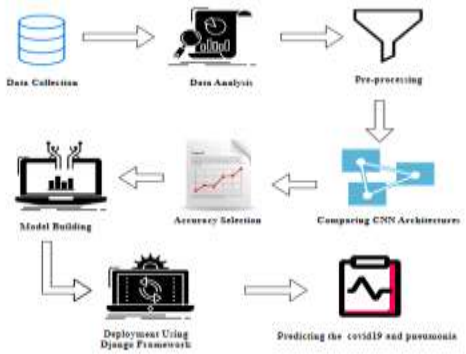
data analysis, the proposed method using MLP machine learning can reach the accuracy of 81.16% for the elderly population and 77.54% for overall population in Taiwan. The regional data analyses with various age groups are also provided in this paper.

[5] Pneumonia screening is one of the most crucial steps in the pneumonia diagnosing system, which can improve the work efficiency of the radiologists and prevent delayed treatments. In this paper, we propose a deep regression framework for automatic pneumonia screening, which jointly learns the multi-channel images and multi-modal information (i.e., clinical chief complaints, age, and gender) to simulate the clinical pneumonia screening process. We demonstrate the advantages of the framework in three ways. First, visual features from multi-channel images (Lung Window Images, High Attenuation Images, Low Attenuation Images) can provide more visual features than single image channel, and improve the ability of screening pneumonia with severe diseases. Second, the proposed framework treats chest CT scans as short video frames and analyzes them by using Recurrent Convolutional Neural Network, which can automatically extract multiple image features from multi-channel image slices. Third, chief complaints and demographic information can provide valuable prior knowledge enhancing the features from images and further promote performance. The proposed framework has been extensively validated in 900 clinical cases. Compared to the baseline, the proposed framework improves the accuracy by 2.3% and significantly improves the sensitivity by 3.1%. To the best of our knowledge, we are the first to screen pneumonia using multi-channel images, multi-modal demographic and clinical information based on the large scale clinical raw dataset.

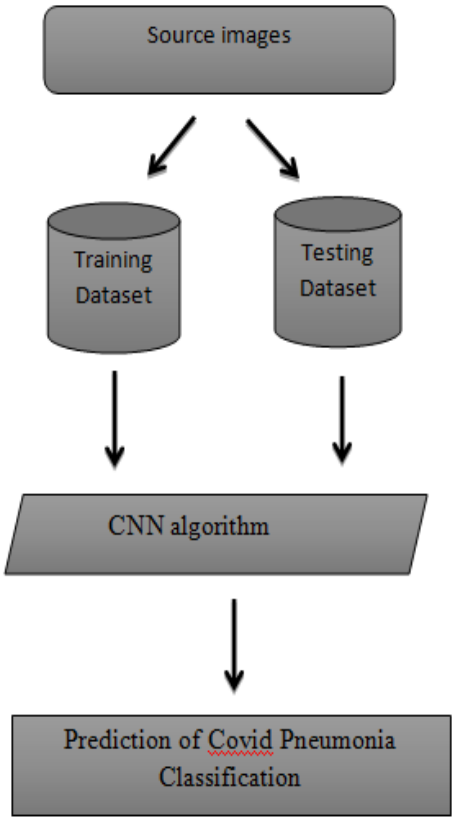
3. PROPOSED SYSTEM

proposed method is to train a deep learning algorithm capable of classifying covid-19, pneumonia and normal images. We classify the images based on Convolutional Neural Network (CNN) Algorithm. Initially we analyze the dataset and implemented the CNN Architectures for train our dataset. It is predicted that the success of the obtained results will increase if the CNN method is supported by adding extra feature extraction methods to classify the images successfully. We are using Tensorflow, Keras packages for creating CNN architectures. Most of the predefined packages are available in python, so we go for the python programming language. More than two architectures were implemented, so we can get different accuracies in different architectures. We compare to select the best architecture by the result of accuracy. Once we get more accuracy then we can save the model. After deploying Django Framework for User Interface purpose

4. DESIGN ARCHITECTURE



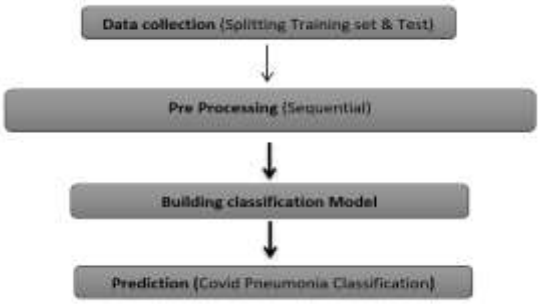
4.2 WORKFLOW DIAGRAM



5. MODULE

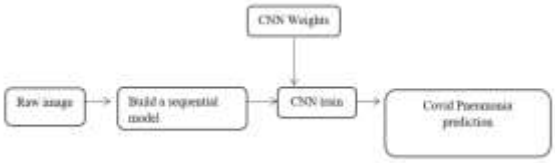
MODULE 1: DATA PREPROCESSING

Preprocessing and Training the model (CNN): The dataset is preprocessed such as Image reshaping, resizing and conversion to an array form. Similar processing is also done on the test image. A dataset consisting of about 4 different Covid pneumonia is obtained, out of which any image can be used as a test image for the software.



MODULE 2: DATAANALYSISOFVISUALIZATION

The train dataset is used to train the model (CNN) so that it can identify the test image and the disease it has CNN has different layers that are Dense, Dropout, Activation, Flatten, Convolution2D, and MaxPooling2D. After the model is trained successfully, the software can identify the Covid, Pneumonia Classification image contained in the dataset. After successful training and preprocessing, comparison of the test image and trained model takes place to predict the Covid, Pneumonia.



6. RESULT

Experimental Environment The software and hardware environment configurations used in this paper are listed in Table 1. 4.2 Experimental Data The obtained dataset is filtered and cleaned, because the pneumonia dataset in this paper contains bacterial pneumonia and viral pneumonia, there are more pneumonia X-r images. However, only the binary classification of pneumonia and normal X-ray image recognition is performed. To guarantee the accuracy of the pneumonia recognition, we remove some of the pneumonia images to ensure that the numbers of pneumonia and normal images are the same. The dataset for training and testing the deep learning models for pneumonia recognition in X-ray images are obtained, containing a total of 2500 images, with 1250 images of pneumonia patients and 1250 images of healthy TABLE 1 ENVIRONMENT CONFIGURATIONS Environment configurations Details OS Windows 10 Professional Programming language Python Deep learning framework PyTorch Dependent library Torch,Numpy,CUDA etc. CPU Intel Xeon Gold 5118 CPU CPU Frequency (GHz) 2.30 CPU core 48 CPU RAM (GB) 128 GPU Quadro P6000 GPU memory (GB) 24 CUDA cores 3840 CUDA version v9.0 people. 80% of the images with and without pneumonia are randomly selected as the training set, and the remaining 20% are selected as the testing set. Therefore, the training set contains a total of 2000 images, 1000 normal images, and 1000 images with pneumonia. The testing set contains a total of 500 images, 250 normal images, and 250 images with pneumonia. Among them, normal human chest X-ray images have fewer impurities in the lungs, as illustrated in Fig. 5 (a). In contrast, the lung pictures of chest X-ray images of patients with pneumonia are less clear, with blurred and thickened lung textures, as illustrated in Fig. 5 (b). Then, 2500 images that are divided into training and testing sets are processed utilizing manual methods to remove the image background to obtain 2500 X-ray images of the heart and lung parts without a background to train and test the deep learning model for pneumonia recognition in X-ray images considering the image background. The background-removed X-ray images of pneumonia patients and healthy subjects are illustrated

7. CONCLUSION AND FUTURE SCOPE

A collection of x-ray images we have. To train the machine to classify the types of Covid, Pneumonia. This project contains four different Covid, Pneumonia. We train to teach the machine to achieve he accuracy and get the possible outcome.

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