Abstract: Data Mining and Machine Learning plays most motivating space of exploration that become generally well known in wellbeing association. It likewise has a crucial impact to reveal new examples in therapeutic science and administrations affiliation which subsequently obliging for every one of the gatherings related with this field. This undertaking expect to frame a symptomatic model of the normal sicknesses dependent on the manifestations by utilizing information mining method like arrangement in wellbeing space. In this paper, we will utilize AI calculations and profound realizing which can be used for health care diagnosis. In this paper we are proposing the disease identification using symptoms and images of lung cancer. Chest x-ray images of covid and pneumonia disease. Accordingly we are recommending the precautions and hospital to the patient.

Keywords- Disease Prediction, Deep Learning and Neural Networks, Random Forest, KNN

I. INTRODUCTION

Human is master in getting data, while machine is master at communicating and handling information. In this paper, we propose a model for patient side effect closeness examination by exploiting the machine's capacity to process information. The model utilized patient's portrayals of indications to remove key data and accomplish early expectation and mediation. Consequently, the precision of likeness examination model to a great extent decides the adequacy of infection expectation. Accurately predicting diseases plays a significant role in public health, especially at the early stage which allows patients to take prevention treatments in time. With the growing volume and availability of electronic health records (EHRs), predictive modeling tasks for disease progression and analysis have obtained increasing interest from researchers. The EHR data are temporally sequenced by patient visits with each visit represented as a set of high dimensional clinical events. Mining EHRs is especially challenging compared to standard data mining tasks, due to its noisy, irregular and heterogeneous nature. Recently, deep learning and machine learning approaches have been widely adopted and rapidly developed in patient representation learning.

II. Literature Survey:

Qiuling Suo, Fenglong Ma et al. [1] Stated that presenting a novel time fusion CNN framework to simultaneously learn patient representations and measure pairwise similarity. Compared to a traditional CNN, our time fusion CNN can learn not only the local temporal relationships but also the contributions from each time interval. Along with the similarity learning process, the output information which is the probability distribution is used to rank similar patients.

Prabakaran.N and Kannadasan et al. [2] compares recent healthcare data against data from that particular baseline distribution and hence classifies subgroups of the given data. In addition, the data sample data used is first tested against many types of classifiers and various other proposed test scores have been evaluated.

Peiying zhang, Xingzhe huang et al. [3] proposed a sentence similarity model to carry out symptom similarity analysis to achieve elementary disease prediction and early intervention, which makes use of word embedding and convolutional neural network (CNN) to extract a sentence vector that contains keyword information about the patient’s feelings and symptoms. In order to increase the accuracy of sentence similarity computation, this model integrated syntactic tree and neural network into the computation process. Our main innovation is to use symptom similarity analysis model for disease prediction and early intervention. In addition, the SPO kernel is also one of the innovations.

Zhaoqian Lan. Guopeng Zhou [4] proposes AI-assisted prediction system, which leverages data mining methods to reveal the relationship between the regular physical examination records and the potential health risk. It can predict examinees' risk of physical status next year based on the physical examination records this year. The system provides a user-friendly interface for examinees and doctors. Examinees can know their potential health risks while doctors can get a set of examinees with potential risk.

Pär Salander et al. [5] proposed that Most spouses witnessed months of global dysfunction preceding the symptom leading to physician consultation. The patient factors 'less alien symptoms', 'personality change' and 'avoidance'; the spouse factors 'spouse's passivity' and 'spouse's successive adaptation'; and the physician factors 'reasonable alternative diagnosis', 'physician's inflexibility' and 'physician's personal values' were identified as obstacles on the pathway to appropriate medical care.

III. Problem Statement

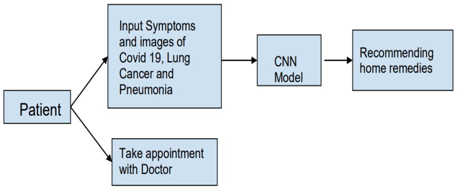
1. To detect Pneumonia, Covid19 and Lung Cancer using image data and by symptoms.
2. It is a tool which will take input as the X-Ray & CT scan images as well as the symptoms and it will predict the possibilities of the disease and its stages using deep learning and machine learning.

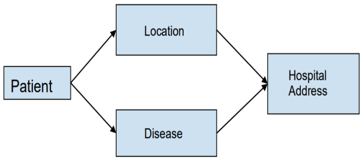
IV Proposed Method and Algorithm:

A. Proposed Methodology:

In a propose system, we are proposed experiment on detecting disease like Pneumonia, Lung Cancer and Covid and recommend hospitals for specific disease with limited set of supervised data.

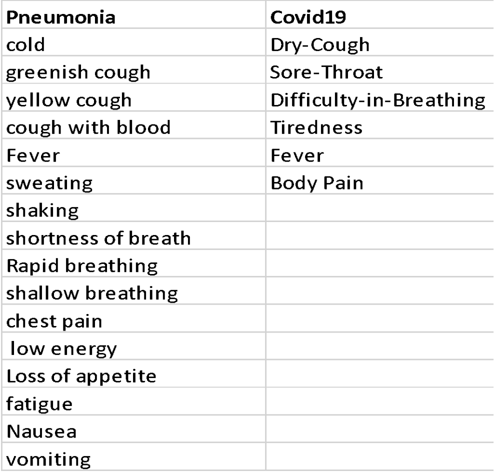
We come through a wide range of different and major algorithms for predicting the monotonous diseases with comprehensible symptoms while working in the field of Supervised Machine Learning such as support vector machine. We are recommending the nearest hospitals from the patients location through KNN. By using CNN we are classifying the disease through images.


Patient
Input Symptoms and images of Covid 19, Lung Cancer and Pneumonia
CNN Model
Recommending home remedies
Take appointment with Doctor



B. Dataset

In this project we are collecting the data from kaggle platform. We require two different datasets one for symptoms in Table 1 and another for disease prediction based on image as shown in figure2.



Pneumonia	Covid19
cold	Dry-Cough
greenish cough	Sore-Throat
yellow cough	Difficulty-in-Breathing
cough with blood	Tiredness
Fever	Fever
sweating	Body Pain
shaking	
shortness of breath	
Rapid breathing	
shallow breathing	
chest pain	
low energy	
Loss of appetite	
fatigue	
Nausea	
vomiting	

Table1. Symptoms

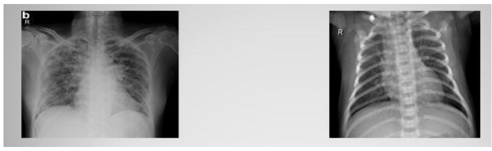


Figure2. Chest X-Ray Images

C. Algorithms

1.Tfidf

Term frequency-inverse document frequency is a text vectorizer that transforms the text into a usable vector. It combines 2 concepts, Term Frequency (TF) and Document Frequency (DF). The term frequency is the number of occurrences of a specific term in a document. Term frequency indicates how important a specific term in a document. Term frequency represents every text from the data as a matrix whose rows are the number of documents and columns are the number of distinct terms throughout all documents. Document frequency is the number of documents containing a specific term. Document frequency indicates how common the term is. Inverse document frequency (IDF) is the weight of a term, it aims to reduce the weight of a term if the term's occurrences are scattered throughout all the documents.

2. Convolutional Neural Networks(CNN)

Convolutional Neural Networks (which are additionally called CNN/ConvNets) are a kind of Artificial Neural Networks that are known to be tremendously strong in the field of distinguishing proof just as picture order.

Four main operations in the Convolutional Neural Networks are shown as follows:

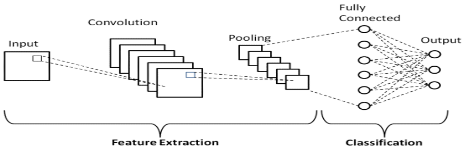


Figure3. Architecture of CNN

(i) Convolution

The principle utilization of the Convolution activity if there should be an occurrence of a CNN is to recognize fitting highlights from the picture which goes about as a contribution to the primary layer. Convolution keeps up the spatial interrelation of the pixels This is finished by fulfillment of picture highlights utilizing miniscule squares of the picture. Convolution equation. Every picture is seen as a network of pixels, each having its own worth. Pixel is the littlest unit in this picture grid. Allow us to take a 5 by 5(5*5) framework whose qualities are just in twofold (for example 0 or 1), for better agreement. It is to be noticed that pictures are by and large RGB with upsides of the pixels going from 0 - 255 i.e 256 pixels.

(ii). ReLU

ReLU follows up on a rudimentary level. All in all, it is an activity which is applied per pixel and overrides every one of the non-positive upsides of every pixel in the component map by nothing.

(iii). Pooling or sub-sampling

Spatial Pooling which is likewise called sub-sampling or down sampling helps in lessening the elements of each element map yet even at the same time, holds the most important data of the guide. Subsequent to pooling is done, in the long run our 3D element map is changed over to one dimensional component vector.

Libraries used for CNN are: Keras and tensorflow.

3. Random Forest

An inconsistent forest district is a man-made understanding strategy that is used to oversee lose the confidence and coordinate issues. It utilizes pack understanding, which is a structure that joins various classifiers to give deals with any outcomes concerning complex issues. An unpredictable boondocks estimation integrates different decision trees. Tree decision by the fanciful forest area locale appraisal is ready through crushing or bootstrap adding up to. Pressing is a social event meta-evaluation that game plans with the precision of man-made understanding estimations. The (capricious backwoods) evaluation spreads out the outcome thinking about the assumptions for the decision trees. It predicts by taking the normal or mean of the outcome from various trees. Creating how much trees accumulates the exactness of the outcome as we displayed in figure.

Libraries used for Random Forest are: sklearn and pickle

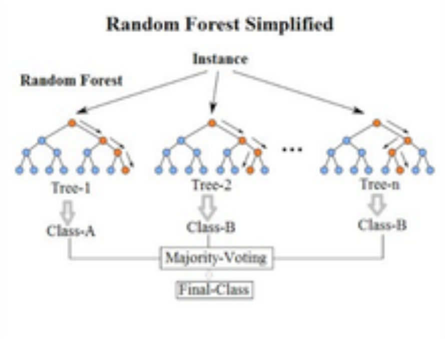


Fig4. Random Forest Architecture

4. KNN

A refinement of the k-NN characterization calculation is to gauge the commitment of every one of the k neighbors as indicated by their distance to the inquiry point, giving more prominent load to nearer neighbors. The KNN classifier recommending the emergency clinic subtleties for infection dependent on the closest distance.

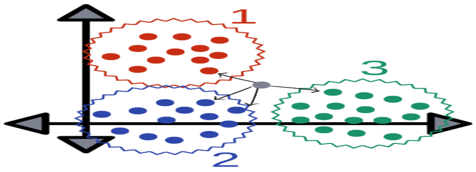


Fig5. KNN Architecture

$d=\sqrt{((x2-x1)^2+(y2-y1)^2)}$

d=distance

x1, x2, y1, y2 = data points

Libraries used for KNN are: geopy and pickle

IV. Results & Discussion

In our experimental setup, as shown in table 2, the total numbers of 587 of trained images for three diseases such as Pneumonia, Lung Cancer and Covid and 132 new images were tested. These images go through CNN framework by following feature extraction using our image processing module. Then our trained model of classification of diseases get classifies the image into specifies disease. We get the accuracy 89.45% at 100 epochs.

Sr. No.	Category	Number of Images
1	Training	587
2	Testing	132

Table2. Classification of Data

By using Random Forest Algorithm, for symptoms based classification, the accuracy obtained is 90%

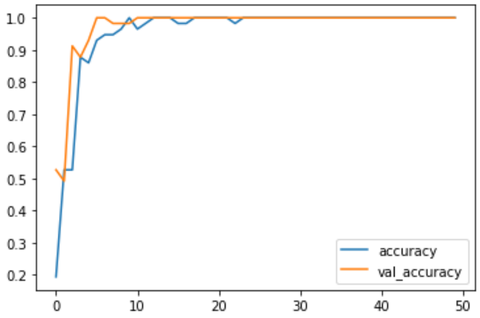


Fig6. Accuracy Graph

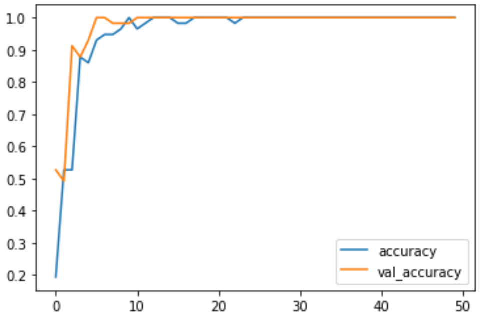


Fig6. Loss Graph

V. Conclusion

In the paper, we have developed Symptoms based disease prediction which is based on Machine Learning and disease prediction by image data using deep learning. This system is useful for both doctors and patient. A patient can predict the disease based on the symptoms and recommend the hospital also and doctors will identify the disease uploading chest x-ray images/ CT-Scan images. Our system takes symptoms and image as input and gives output as disease, possible precautions.

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