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Pneumonia Detection Using CNN

Dr. Mrunal Pathak[1], Suvidh Bhurat[2], Rohan Bhosale[3], Prathmesh Pawar[4]
Assistant Professor, Department of Information Technology
Students, Department of Information Technology[2,3,4]
AISSMS Institute of Information Technology, Pune, Maharashtra, India

Abstract: *The medical field is most sensitive domain of all the fields. Cause is deals with the human body human body parts. As the people are become advanced day by day and they move towards automation for their comfort. The machine is also being smarter and accurate due to the availability of a large amount of data and fast computing power. So as a result machine learning becomes an important pillar in life. People now become more reliable to machine than man decision. So, here we try to build machine learning model to detect pneumonia. Pneumonia is the leading death of cause among young children and one of the top major causes worldwide. The pneumonia is detected using examine of chest X-Ray radiograph by highly-trained specialists. This process is tedious and often leads to a disagreement between radiologists. Analyzing chest x-rays is a difficult task and requires precision. Pneumonia, a symptom of Covid-19, is a life-threatening condition that affects the lungs. We aim at designing a highly efficient system to predict a user suffers from Pneumonia by analyzing the patient's chest X-ray images and increasing the accuracy of the system by use of CNN.*

Keywords: VGG16, Keras, Tensors, Matplotlib, Flask

I. INTRODUCTION

In day to day life many factors that are affect a human heart. Many problems are occurring at a rapid pace and new heart diseases are rapidly being identified. In today's world of stress Heart, being an essential organ in a human body which pumps blood through the body for the blood circulation is essential and its health is to be conserved for a healthy living. The health of a human heart is based on the experiences in a person's life and is completely dependent on professional and personal behaviours of a person. There may also be several genetic factors [4] through which a type of heart disease is passed down from generation**.** Pneumonia accounts for around 16% of all deaths of children fewer than five years worldwide, being the world's leading cause of death among young children. In the United States only, about 1 million adults seek care in a hospital due to pneumonia every year, and 50, 000 die from this disease. The pneumonia complicating recent corona virus disease 2019 (COVID-19) is a life-threatening condition claiming thousands of lives in 2020**. T**he increase in the possibility of heart disease among young may be due to the bad eating habits, lack of sleep, restless nature, depression and numerous other factors such as obesity, poor diet, family history, high blood pressure, high blood cholesterol, idle behaviour, family history, smoking and hypertension. The pneumonia detection is commonly performed through examine of chest X-Ray radiograph (CXR) by highly-trained specialist It usually manifests as an area or areas of increased opacity on CXR. Our approach uses convolution neural networks (CNN). The algorithm automatically locates lung opacities on chest radiographs and it is one of the best performances in the challenges.

II. SYSTEM IMPLEMENTATION

The following section gives a detailed in sight in to method of development and procedures, algorithms, methodologies and various other aspects that will be brought in use for the working problem case. The goal is to do a thorough analysis for the implication of best fit models and algorithms that will make the system effective. Before the process of selection of algorithms for the proposed work, we need to focus on data at first. Since there may be large variability in the datasets, containing high anomaly values and other white noises.

2.1 Pre processing

Digital image processing is the use of a digital computer to process digital images through an algorithm. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image

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processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. The generation and development of digital image processing are mainly affected by three factors: first, the development of computers; second, the development of mathematics (especially the creation and improvement of discrete mathematics theory); third, the demand for a wide range of applications in environment, agriculture, military, industry and medical science has increased.

2.2 Model Training

VGG16 is a convolution neural net (CNN) architecture which was used to win ILSVR(Imagenet) competition in 2014. It is considered to be one of the excellent vision model architecture till date. Most unique thing about VGG16 is that instead of having a large number of hyper-parameter they focused on having convolution layers of 3x3 filters with a stride 1 and always used same padding and maxpool layer of 2x2 filter of stride 2. It follows this arrangement of convolution and max pool layers consistently throughout the whole architecture. In the end it has 2 FC(fully connected layers) followed by a softmax for output. The 16 in VGG16 refers to it has 16 layers that have weights. This network is a pretty large network and it has about 138 million (approx) parameters.

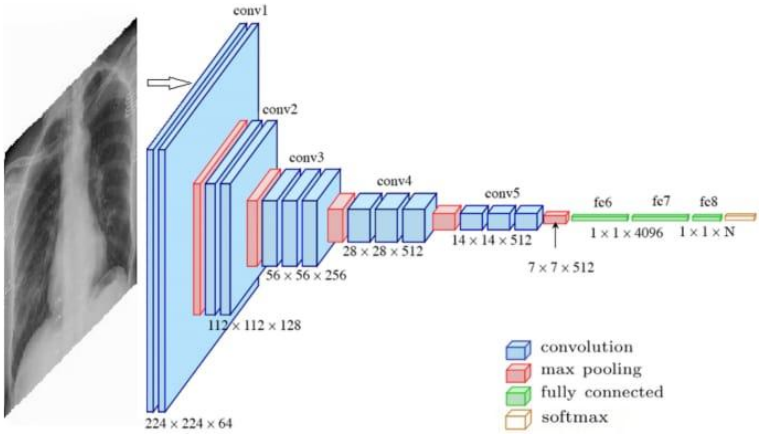

Figure 1: VGG16 in Pneumonia Detection using CNN

III. ALGORITHM

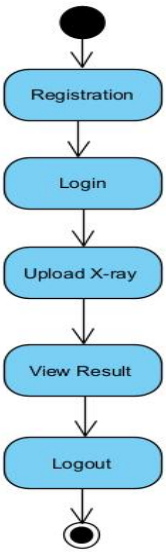

Figure 2: State Diagram

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3.1 User Login

Firstly user should create the user account and login to the system for the detection of pneumonia using chest x-ray.

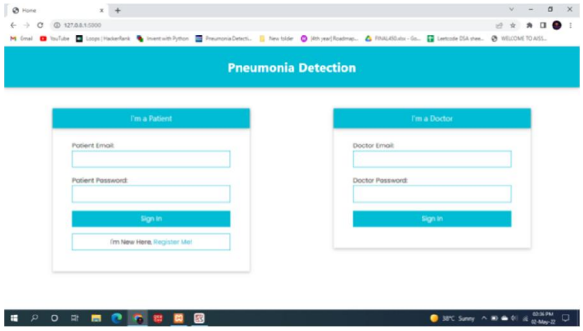
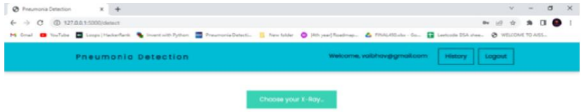


Figure 3: Login Page

3.2 Select X-ray

User should select the x-ray and upload to the system and wait for result.



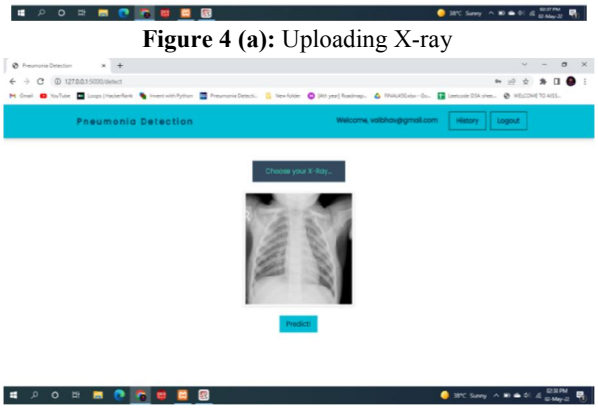


Figure 4 (a): Uploading X-ray

Figure 4(b): Uploading X-ray

3.3 Comparing Train Images

The users uploaded chest x-ray will be compared with train model and it display the result. We had trained the model using huge amount of data set of chest x-ray images which are taken from Kaggle.

3.4 View Results

The user will see the possible outcomes by the system which may be accurate upto 96%. But the user should wait for doctor's suggestion.

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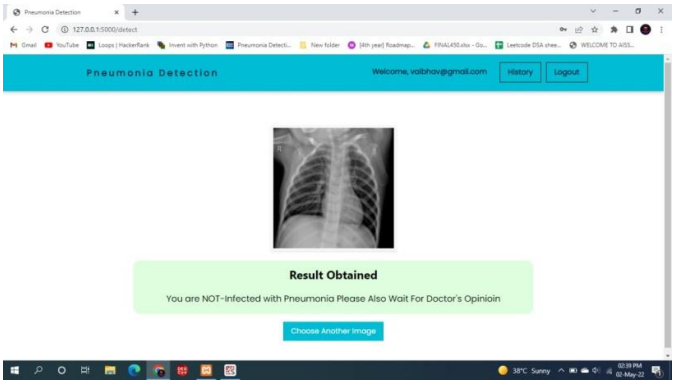

Figure 5(a): Result: Not infected with Pneumonia

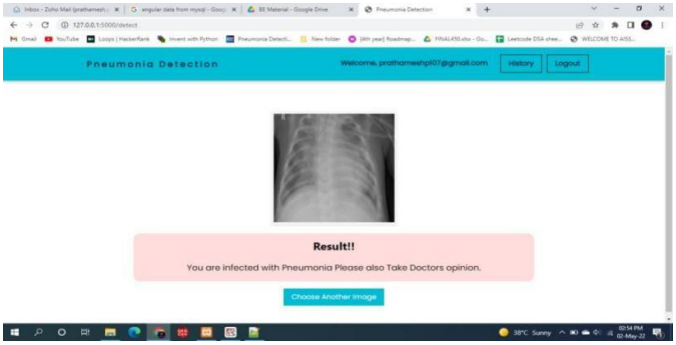

Figure 5(b): Result: Pneumonia Detected

3.5 Wait for Doctors suggestion

In this, user should wait for doctor's suggestion. The doctor will check the uploaded x-ray images and tell the final result.

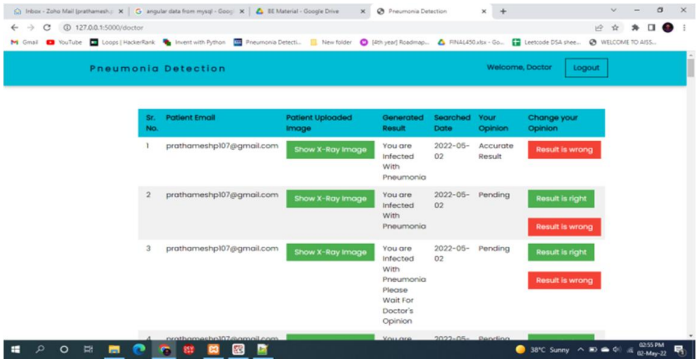

Figure 6: Doctors Checklist

IV. RESULTS

Before our project some people also try to build project like us but in our project we try to overcome some of the limitations which they have. In this project we try to build a flask web app which helps patients to upload their chest x-ray image to a site and get the specific result. Our train model gives accuracy of 96% and by using this model patients can get results if they have pneumonia or not. Also their data is saved and forwarded to available doctors. We also take doctor as part of our project after user get result they can also get doctors opinion and we also developed user friendly UI . In this site doctor can open and see patient x ray images and select the option is result is right or wrong.

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V. CONCLUSION

The proposed system planned after extensive research during a literature survey includes the implementation of transfer learning for predicting pneumonia based on the chest x- ray image provided as input by the user. The system will provide the final result that whether that person is having pneumonia or not. It will also provide highest accuracy from the three different classifiers. Easy user interface has been designed keeping the user's convenience in mind.

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