Detection of Pneumonia Chest X-ray Using Inception Google Net Classification.

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Abstract—the most vital organ in any living is the lung, which is responsible for the continuous breathing and respiration. Pneumonia patient leads to the rapid development of pus in a person’s lungs caused by various factors especially most common respiratory viruses, which could lead to severe fatigue. It is very clear from the various campaigns and studies conducted by several agencies pneumonias found to span from the young to the elderly; it is commonly attributed to lack of hygiene. The most usual method used by medical practices is utilizing the chest X-ray scans for the purpose of medical diagnosis of pneumonia patient. This practice does not give accurate diagnosis in e.g. patient would need to consult doctor. There are several cases of clinical errors leading to false diagnosis of the disease, leading to life threatening situations. In this research, we have developed a system leveraging the deep learning architecture, inception Google net to efficiently perform diagnosis using the chest X-rays scans of a patient to detect if the patient is affected from pneumonia, if affected the severity of the disease in the patient is also identified, thus providing a good insight on the treatment required by the patient. The system could achieve very high accuracy in the prediction and also could be very helpful and enable patients to explore state of the art medical diagnosis systems.

Index Terms—Lung abnormality, Pneumonia disease, Deep Learning, Convolutional Neural Network, Inception Google net.

INTRODUCTION—Lung abnormality, Pneumonia disease, Deep Learning, Convolutional Neural Network, Inception Google net.

Pneumonia is a disease that targets the lungs of patient resulting in severe fatigue caused due to the disruption of normal respiration in the patient due to the development of no strip fluids such as phlegm and phlegm. The patient if left uncatered for the disease to lead to other severe lung infections thus complicating this verity of the pneumonia disease. Pneumonia is a negatively phenomenal fever that has perished the lives of several children and elderly across the globe disrupting all stages of life. It is concluded that pneumonia is responsible for the deaths of close to 13 around the globe especially in countries where hygiene is insufficient. Multiple agencies have recommended symptoms and signs that disrupt the ordinary way of life that could point to the pneumonia disease 1) Severe pain and fatigue in the chest 2) Severe vomiting caused by the phlegm and mucus 3) Uncontrollable cough and cold 4) Severe fever and chills during the night.

RELATED WORKS

There are many papers and journals published in the field of diagnosis of pneumonia and other diseases that have been taken as reference for this research. The following is the list of all papers used for their search of medical diagnosis of pneumonia. A. Pneumonia Detection Using Deep Learning Based on Convolutional Neural Network 2021. In the field of computer science, artificial intelligence has given rise to multiple solutions that requires human intervention which is often doubted to be accurate. Artificial Intelligence provides solution to problems that require good decision making. In the field of medical research artificial intelligence has opened avast number of opportunities to explore solutions. Especially in the medical diagnosis of disease that handle digitalis images such as CT scans and X-rays. For the purpose of better accuracy machine learning is used to provide an application. This paper helps in better and accurate diagnosis of pneumonia disease using lung scan images with the use of machine learning. This model is responsible to be consistent with diagnosis of the pneumonia disease using the lung scan images. B. A Deep Convolutional Neural Network Based Framework for Pneumonia Detection, 2021. Pneumonia is a very dangerous disease that has claimed the lives of 14 diseased people can be cured very easily. For medical diagnosis lung X-rays scans have been effectively utilized, but requires a medical personal such as a radiologist for the diagnosis using the X-ray scans. There is a large demand for modern technological solution to automate the prediction of the disease, earlier it was not cost-effective using machine learning algorithms. More than the machine learning architectures it has been understood Convolutional neural networks provide better results. In this research an algorithm using the Alex net and SVM are leveraged combined.

C. Pneumonia Detection: An Efficient Approach Using Deep Learning, 2020

Across the world pneumonia is found to be a deadly disease. Africa is found to be the most affected from pneumonia, especially in the elder generation and newborn bringing grief to families. The WHO has recognized a pandemic for the pneumonia disease outbreak in Wuhan, China. Using the X-rays of patients, the main objective of this study is to detect pneumonia disease in patients. Medical diagnosis of pneumonia involves very heavy effort from the medical field. Deep learning architecture is used to solve this problem for doctors. In the project, an effective solution to the medical diagnosis of pneumonia is understood by comparing their search of a previous forum. D. Deep learning Enables Accurate Diagnosis of Novel Corona...
Brain tumor is a deadly disease caused by development of brain cells. The effective treatment of tumors first begins with identifying the part of the brain affected from tumor and the size of it. It’s always best to keep in mind the time duration within which the medical diagnosis is to be completed. In image processing, the most difficult concept is that of brain tumor detection. Utilizing the HMRF and threshold methods, this research paper proposes and advance method for brain tumor detection.

M. Multi-label classification of brain tumor mass-spectrometry data
There are multiple three hold methods to effectively identify data points that support in the effectivedetection and identification of boundary in brain tumors. From the lung scan of a potential patient the diagnosis for lung cancer can be carried forward using the algorithm used in this project. In the future with the rise of deep learning technology the accuracy of the project can be improved significantly.

N. An Intelligent System for Early Assessment and Classification of Brain Tumor
In the modern medical research, due to the advent of data mining, it has been attributed solving decision making, early diagnosis and treatment, identifying patterns in large medical data sets. This paper contributes to diagnosis of tumor in the brain using segmentation and distortion of data set. In this project, the SVM (Support Vector Machine) algorithm is utilized to effectively detect the occurrence of brain tumor in patient at very high success rate. The project also recommends the degree of the brain tumor.

O. Early Cancer Detection in Blood Vessels Using Mobile Nanosensors
By the vast scientific advances in the medical field especially in the field of oncology, cancer cells in a patient can be effectively identified using sensors called the nano sensor. There search closely studies the efficiency of nano sensors that are deployed to the patient, to identify the cancer cells in cardiovascular systems. Then ano sensor near the blood cell can efficiently identify the cancer. Using the nano sensor that are subjected to the patient’s blood stream the cancer cells are effectively identified.

PROPOSED SYSTEM

The most vital organ in any animalism the lung, which is responsible for the continues breathing and respiration. Pneumonia in a patient leads to the rapid development of pus in a person’s lungs caused by various factors especially most common respiratory viruses, which lead to severe fatigue. Its very clear from the various campaigns and studies conducted by several agencies pneumonia is found to span from the young to the elderly, it is commonly attributed to lack of hygiene. The most usual method used by medical practices is utilizing the chest X-ray scans for the purpose of medical diagnosis of pneumonia in a patient. This practice does not give accurate diagnosis in a patient would need to consult doctor. There are several cases of clinical errors leading to false diagnosis of the disease, leading to life threatening situations. In this research, we have developed a system leveraging the deep learning architecture, inception google net to efficiently perform diagnosis using the chest X-rays scan of a patient to detect if the patient is affected from pneumonia, if affected also the severity of the disease in the patient is also identified, thus providing a good insight on the treatment required by the patient. The system could achieve very high accuracy in the prediction and also could be very helpful and deniable patients to explore state of the art medical diagnosissystem.

I. MATERIALS AND METHODS

A. DATASET COLLECTION

For the purpose of medical diagnosis the data set collected is that of chest X-ray of a patients affected from pneumonia based on the severity of the disease. There various means from which this dataset can be procured. 1) Dataset procurement from web 2) Dataset procurement from hospitals and clinics are the two most common methods used for dataset collection in this project.

1) Data collection from the web: The imagedataset for
this project required is that of chest X-ray scans that can be collected by manually scraping the web for the appropriate images. It is a very challenging task to collect the appropriate image dataset manually from the web. The label required from this dataset can be extracted from various annotation tools. The following are the list of accredited sites for downloading the image dataset: 1) www.kaggle.com 2) www.dataworld.com. Hospitals and clinics In the case of collecting real-time image data from the hospitals and clinics, one must visit the medical facility and obtain records of the specific case in this project we could collect the chest scans of patients affected from pneumonia according to the degree of severity of disease in the patient.

B. DATA AUGMENTATION

Dataset augmentation is a mechanism to effectively elaborate the image dataset, by effectively altering the resolution, orientation and view of the image data set. Due to the heterogeneous nature of the image dataset collected the data set is not uniform any of the aspects beater solution, size and orientation. This disparity could lead to very poor accuracy achieved by the deep learning model. The data set preprocessing method is responsible for the effective standardization of the dataset in terms of resolution, size and a spectratio. The data set preprocessing is effective in reducing the noise in an image.

C. PNEUMONIA DETECTION USING THE INCEPTION GOOGLE NET ARCHITECTURE

In this project, caption google enter is used as the deep learning architecture to achieve an automatic system for the diagnosis of pneumonia, based on the severity of the disease in the patient with the chest X-ray scans. The inception google net consist of 9 inception modules and 22 Convolutional layers. One of the major positive of this inception google net is that the model aims to reduce the input image size but retains the accuracy of the model.

The height and width of the input image can be minimized by the max-pooling layer, for which it is used. This is a very efficient method to minimize burden on the processing unit by effective making the input image less complicated by reducing various aspects such as aspect ratio and resolution using these layers.

results

The project consists of data set collected from various sources of four classes 1) Normal 2) Mild 3) Moderate 4) Severe pneumonia as describe by the image below:

The following step would be of dataset augmentation to improve the represent ability of the acquired image dataset:

Fig. 3. BEFORE DATA AUGMENTATION

The below figure 4 shows the dataset after data augmentation

Fig. 4. AFTER DATA AUGMENTATION

The following section will discuss the results of the dataset augmentation.
The following step would be that of before dataset pre-processing which is to bring uniformity to the image dataset collected in Fig.1.DATACOLLECTED.

The following step would be of dataset separation into the four different classes as described in the image below:

![Dataset Separation](image1.png)

**Fig.2.DATASEPARATION**

The following step would be to generate a model file by training the dataset with deep learning architecture Inceptiongooglenet and obtain excellent accuracy:

![Model Efficiency](image2.png)

**Fig.7.EFFICIENCYOFMODELOBTAINED**

The graph plotted for the number of epochs run can be seen in the following figure below:

![Training Graph](image3.png)

**Fig.8.GRAPHPLOTOBTAINEDFROMTHETRAININGPROCESS**
On upload of a chest X-ray scan the severity of the pneumonia disease of a patient can be realized as shown in the image below:

Fig.9. NORMALLUNGSCANDETECTED

On uploading of a chest X-ray scan the severity of the pneumonia disease of a patient is to be found which means the patient is not affected from pneumonia. The below image displays the detection of mild lung-x-ray

Fig.10. MILDLUNGSCANDETECTED

The below image displays the moderate lung-x-ray:

Fig.11. MODERATELUNGSCANDETECTED

The below image displays the severe lung-x-ray:

Fig.12. SEVERELUNGSCANDETECTED

CONCLUSION AND FUTURE WORK

This project provides an automatic system for efficient diagnosis of pneumonia in a patient based on the severity of the disease. The system utilizes the inception Google net to achieve the prediction model based on four classes of severity of the disease. The system provides a cost-efficient and time-efficient solution to people who don’t have access to adequate equality health care facility. The system is also proven to be very reliable for very high accuracy of 83% achieved using deep learning. The project has very vast potential when it comes to be developed as a benchmark for diagnosis systems using the deep learning technology. The prototype can be enhanced to be utilized a fully-fledged product in the field of health care providing affordable healthcare for the general public. The system could enlighten and encourage future enhancements in the field of deep learning appreciating the medical health care field.
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