ABSTRACT

Pneumonia is one of the serious diseases that is caused by a bacterial or viral infection of the lungs and has the potential to result in severe consequences within a short period. Therefore, early diagnosis is a key factor in terms of the successful treatment process. Thus, there is a need for an intelligent and automatic system that has the capability of diagnosing chest X-rays and to simplify the pneumonia detection process for experts as well as for novices. This study aims to develop a model that will help with the classification of chest x-ray medical images into normal(healthy) vs abnormal(sick). To achieve this, seven existing state-of-the-art machine learning techniques and well-known convolutional neural network models have been employed to increase efficiency and accuracy. In this study, we propose our machine learning for the classification task, which is trained with modified images, through multiple steps of preprocessing. Experimentally, it demonstrated that the machine learning technique for the classification task performs the best, compared to the other seven machine learning techniques. In this study, we successfully classified chest infection in chest predict using on CNN with an overall accuracy of 98.46%. It achieved a more successful result in detecting pneumonia cases. Machine learning models. In this study, we propose a method for image-based diagnosis for Pneumonia leveraging deep learning techniques and interpretability of explanation models such as Local Interpretable Model-agnostic Explanations and Saliency maps. We experiment on a variety of sizes and Convolutional neural network architecture to evaluate the efficiency of the proposed method on the set of Chest x-ray images. The work is expected to provide an approach to distinguish between healthy individuals and patients who are affected by Pneumonia as well as differentiate between viral Pneumonia and bacteria Pneumonia by providing signals supporting image-based disease diagnosis approaches. . This study aims to develop a model that will help with the classification of chest x-ray medical images into normal(healthy) vs abnormal(sick). To achieve this, seven existing state-of-the-art machine learning techniques and well-known convolutional neural network models have been employed to increase efficiency and accuracy. In this study, we propose our deep learning for the classification task, which is trained with modified images, through multiple steps of preprocessing. Experimentally, it demonstrated that the deep learning technique for the classification task performs the best, compared to the other seven

machine learning techniques. In this study, we successfully classified chest infection in chest Xray images using deep leaning based on CNN with an overall accuracy of 98.46%. It achieved a more successful result in detecting pneumonia cases.

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CHAPTER 1

INTRODUCTION

According to the World Health Organization (WHO), pneumonia is one of the most infectious causes of death worldwide, it affects children and families everywhere and causes 50 thousand deaths each year. Recently, the Situation Report - 150 from WHO about COVID-19 presented the number of infected active cases is up to 8*,* 2 million, the number of deaths is 445*,* 535. The patients can get pneumonia as a complication of viral infections such as COVID-19 or the common flu. Besides, the bacteria, fungi, and other microorganisms can also be the primary infectious agents of pneumonia, causing cough with phlegm or pus, fever, chills, and difficulty breathing. Pneumonia is the infection of one or both lungs and filled up with fluid and pus. Based on , up to 60% of the cases are related to respiratory virus infections. The study in indicated the difference between viral and bacterial pneumonia in children is based on the serum C reactive protein (CRP) but the sensitivity is not enough for use in clinical practice. In the field of medicine, diagnostic radiology is significant and used for disease assessment.

To detect the pneumoconiosis early and accurately after the clinical analysis, performing a chest X-ray is important and necessary. It is critical to preventing complications including death. The expert radiologists assessed the X-ray images for the pneumonia fluid in the lungs during the diagnosis. Specifically,contains images of viral (left image), bacterial (middle image) and normal chest (right image) pneumonia. Viral pneumonia presents the diffuse interstitial pattern in both lungs, whereas, bacterial pneumonia typically exhibits a focal lobar consolidation. Furthermore, chest X-ray (CXR or chest radiography) can reveal the abnormalities areas and not only produce images of the chest but also the nearby structures. Nevertheless, the X-ray images consist of black and white colors, it is quite difficult for detecting the infected areas in the images. Additionally, the technical level of radiologists is also important to make the diagnosis correctly. A study in conducted an education in person training for improving chest radiograph interpretation accuracy among non-radiologists clinicians. In recent years, the complexity of medical data makes it more difficult for analyzing and diagnosing the disease. In parallel, the improvements in Machine Learning and Deep Learning have a

certain influence on image processing in general and medicine in particular. The diagnosis process performs with Machine Learning or Deep Learning can help physicians investigate the medical images conveniently and reduce the analysis time. Several studies have resolved the challenging tasks such as medical image classification , skin cancer detection using images , or 3D image biomedical segmentation.

Moreover, Deep Learning-based technologies have successfully demonstrated in clinical practice including clinical decision support systems (CDSS), diagnosis prediction, and predicting the invasiveness of lung adenocarcinoma manifesting based on radionics and clinical features. Though, there are still several challenges with Machine Learning. Selecting a dataset, creating a predictive model, and evaluating and refining the model, the most important thing is data. The implementations of Machine Learning or Deep Learning in health care are influenced by the accuracy of medical data. Specifically, the annotation progress in the medical image is based on medical professional knowledge, medical industry standard, and medical system Pneumonia is one of the serious diseases which cause most of the deaths in adults globally. According to Health Metrics and Evaluation (IHME), the highest pneumonia mortality rates in 2017 were among people aged 70 and older. More than 1.13 million pneumonia-related deaths are reported every year were in this age group . Pneumonia is a disease of infectious origin that causes inflammation in the air sacs or alveoli of one or both lungs The air sacs get filled with fluid which can cause difficulty in breathing and an over-generation of mucus and sputum as shown in . Pneumonia is most commonly caused by viruses or bacteria and, less commonly, other microorganisms]. Nowadays, chest X-ray (CXR) imaging is used commonly for health intensive care and analysis of many lung diseases such as pneumonia, cancer because of relatively low prices. Therefore, Chest X-rays are currently the best available tool for diagnosing pneumonia which has played a huge role in clinical care and epidemiological research However, detecting pneumonia in chest X-rays is a challenging task that relies on the availability of expert radiologists. Accurate image analysis and image interpretation are very crucial for a better diagnosis. Though image interpretation by conventional machine learning algorithms depends mostly on expertly crafted features, computer vision is a very effective machine learning application. However, not all doctors have good diagnosing tools to diagnose patients. As a result, sometimes their diagnosing is not very accurate. It is also much more difficult to judge pneumonia just by looking at

the chest X-rays images.

Therefore, more specific diagnostic tools must be developed which are cheap and accurate in diagnosing pneumonia. With the advancements of information technology, machine learning algorithms have been successfully applied to many healthcare problems and have explained complex relationships, and improved clinical predictions In recent years, several researchers have proposed different artificial intelligence (AI)- based solutions for different medical problems. techniques based on Convolutional neural networks (CNNs) have allowed researchers to obtain successful results in wide medical applications, including classifying skin cancer from skin photographs, detecting metastasis on pathological images and disease classification in X-ray images all of which demonstrated expert-level diagnostic accuracy. As a result of this trend, numerous studies have emerged that analyzes the influence of deep learning and convolutional neural networks in the field of health and imaging medical diagnosis. Specifi- cally, due to successes in other fields especially in medical problems, deep learning algorithms such as Convolutional neural networks (CNNs) have recently been applied for image classification tasks. However, algorithms in those studies have not yet beenfully validated in various data sets, limiting the generalization of the results. Classification methods are among the most commonly used techniques in medical imaging, where the goal is building classifiers that are capable of predicting whether x-ray images are normal or show the presence of Pneumonia. Especially, this study tries to answer the following research question: Could machine learning algorithms be used to assist in the diagnosis of whether a patient has pneumonia or not by looking at chest X-ray images? This inspires us to use machine learning algorithms to predict pneumonia based on the x-ray images. Moreover, it would provide doctors with immediate information about the patient’s condition and risk level to recommend more diagnostic tests without delay. Thus, the investigative and predictive methods, such as machine learning algorithms, are vital to make smart decisions that will help doctors and radiologists to get more information to prevent themselves from misdiagnosing a patient. The primary objective of this study was to examine and evaluate the performance of machine learning techniques and convolutional neural network (CNN) for the classification of pneumonia, which is based on Chest X-ray Images to achieve high accuracy. Other objective is to provide radiologists and medical experts with a tool which is a lower cost .This tools will Be helping radiologists and medical experts to identify the slit and slow changes among.

CHAPTER 2

LITERATURE SURVEY (change the contents)

The recent studies on diagnosing Pneumonia by use of deep learning processing model based on CNN by different authors has been listed in this section.

Fawole et. al and ResNet-50have concentrated inside and out X-X imaging and changed undetectable articles like patient age, vision, and perceivability. also the vector related with the picture. Up to 15 percent of beneficial things require one look.

.Ruuskanen O, et. al The report incorporates 247 radiograms from the Japan Society for Radiology (JSRT). The first picture was diminished to 96 96 and the Log channel was utilized prior to preparing or testing. The presentation of the inside and out preparing technique is surveyed in light of the ID of the knobs on the radiograph, and the outcomes are analyzed.

Juan G.; et. al. Recent work has shown that a round network is profound, finished, and proficient in preparing assuming it contains a short circle between the inbound and outbound lines. In this article, we will investigate the DenseNet network that associates every classification to another level. Conventional L-broken pipes have a L association between each stage and the following stage, while our organization has a straight line (L + 1)/2. For each stage, the guide of the multitude of past areas is utilized as an info, and the information picture is utilized as an info. DenseNets has various

significant benefits: it works with the absence of slope issues, fortifies execution conveyance, upholds execution improvement, and altogether lessens execution. We are assessing our development for four capacities (CIFAR- 10, CIFAR-100, SVHN, and ImageNet) to make the data more exact. DenseNets requires a ton of memory and figuring to accomplish superior execution while accomplishing extraordinary turn of eventsand exceptional innovation across numerous gadgets.

IMAGE QUALITY AFFECTS DEEP LEARNING RECONSTRUCTION OF MRI

Jilani,. et. al Magnetic reverberation imaging (MRI) will in general recognize a wide scope of articles from various points. Now and again, the outcomes can be mistaken for pathology. What's more, present day MR recuperation calculations have a repetitive nature that builds recuperation time. As of late, a top to bottom review technique has been utilized in MRI reproduction to give excellent rapidimaging. Inside and out study is generally subject to learning data, so the nature of learning ought not be neglected. This articletalks about what noisy pictures in media practice mean for the construction of MR reproduction. The normal technique utilizes a weighty misfortune to change the capacity of the line to make the picture more appealing. This page utilizes a similar blunder free stretch; however, this technique can be reached out to other misfortune making exercises. Utilizing fixed heart MRI, this technique is contrasted with the current strategy for eliminating clamor delicate exercise data or overlooking the positive distinction. Indeed, even essential systems will work on the nature of profound gaining from this methodology.

A DEEP CASCADE OF CONVOLUTIONAL NEURAL NETWORKS FOR DYNAMIC MR IMAGE RECONSTRUCTION

Hlemper et. al First of all, we expect that the normal technique for reproducing each 2D picture autonomously is superior to the cutting edge strategy for disentangling the 2D picture, in particular by concentrating on the jargon in view of the MR picture of the design, by mistake and blunder .. Second, When we reproduce a progression of edges together, CNN shows that we can actually learn space-time designs by organizing ends and trading data. We show that the arranged technique is more present day than the current one and that the physical construction can be dependably kept up with for as