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"Survey Paper on Detection of Diseases using Medical imagery and Machine learning"

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Abstract—*Diseases with medical imaginary such as Tuberculosis'And Pneumonia Etc ,which is detected by using chest x-rays etc are rapidly spread disease in the world. When left undiagnosed and thus untreated, mortality rates of patients with such diseases are high. Standard diagnostics still rely on methods developed in the last century. They are slow and often unreliable. So, Computer aided diagnosis (CAD) has been popular and many researchers are interested in this research areas and different approaches have been proposed for the disease detection and lung decease classification. In our paper we have surveyed different method for detection of different diseases in X-Ray image by using Machine learning which includes Pre Processing of Image, classification and Feature extraction from that image.*
Keywords: *Computer aided diseases(CAD), X-ray*

I. Introduction

Due to inefficiency in detecting the x-rays many diseases can be caused such as Pneumonia and Tuberculosis etc which are classified as the fifth leading cause of death worldwide, with about 10 million new cases and 1.5 million deaths per year[1].Being one of the world's biggest threats and being rather easy to cure, the World Health Organization recommends systematic and broad use of screening to extirpate the disease. Poster anterior chest radiography, in spite its low specificity and difficult interpertation[1], is one of the preferred tuberculosis screening methods. Unfortunately, since TB is primarily a disease of poor countries, the clinical officers trained to interpret these chest X-Rays are often lacking

Diseases like Tuberculosis' and Pneumonia' infections need to be X rayed and screen for active TB and Pneumonia to ensure a proper treatment of their infections. Taking Standard Chest X-rays (CXRs) is an inexpensive way to screen for the presence of Diseases. The purpose of screening system is to identify everything that is or could be related to a patient having Diseases infections. But mass screening of a large population is a time consuming and tedious work, which require considerable effort when done manually.

For this reason, Computer-aided diagnostic systems (CAD) used to detect Diseases infections in different X rayed. These systems have the potential to lessen the Diseases detection error risk and also depend on the radiologists.

In this project, we describe how we differentiate between normal and abnormal CXRs with manifestations of different Diseases, using image processing techniques.

II. Literature Survey

Automated diagnosis of tuberculosis, pneumonia and different chest diseases from chest X-Rays (CXR) has been tackled with either hand-crafted algorithms or machine learning approaches such as support vector machines (SVMs) and convolutional neural networks (CNNs). Most deep neural network applied to the task of tuberculosis diagnosis have been adapted from natural image classification. These models have a large number of parameters as well as high hardware requirements, which makes them prone to over fitting and harder to deploy in mobile settings. We propose a simple convolutional neural network optimized for the problem which is faster and more efficient than previous models but preserves their accuracy. Moreover, the visualization capabilities of CNNs have not been fully investigated. We test saliency maps and grad-CAMs as tuberculosis visualization methods, and discuss them from a radiological perspective.

Over the last years, end-to-end trained convolutional neural networks (CNNs) have shown drastically superior performance on a multitude of image analysis challenges when compared to more classical hand-crafted algorithms or even other machine learning approaches such as support vector machines, in particular when the challenge can be sufficiently well characterized by abundant labeled training data. This makes deep learning a promising approach for medical image analysis and showed state-of-the art performances in tasks spanning from breast cancer classification, organ and tumor segmentation to scan time reduction for diffusion MRI, to name a few.

The use of deep learning on chest X-Rays has attracted some attention due to the cheapness of this imaging technique, the abundance of data and the similarity to natural images, which allows the transfer of models to medical tasks. The effectiveness of these algorithms on chest x-ray data has been shown in various publications, with some even generating automatic annotations for the symptoms.

For the case of tuberculosis diagnosis, deep convolutional networks have demonstrated performances at least on par with those of the best competing approaches, while being conceptually simpler. Competing approaches often make use of complex machine learning pipelines3,4,8 . For instance, Vajda et al. use a pipeline that starts with an atlas based lung segmentation algorithm, then extracts manually selected features such as shape and curvature descriptor histograms or the Eigen values of the hessian matrix, and finally uses a classifier to diagnose the disease. They obtain results on par with results using deep learning6, but their multi-stage pipeline is more complex that an end-to-end trained convolutional neural network and requires more development work.

Previous publications using deep learning adopt deep learning models such as AlexNet, GoogLeNet and ResNet, which were developed for natural images classifications tasks5,6,7. While these are very powerful classifiers, they have been developed and optimized to be trained on more than a million images and to distinguish between a thousand classes. As a consequence, they require large amounts of memory and computation, both for training and inference, and their large number of degrees of freedom makes them prone to over fitting and less likely to generalize well when applied to medical tasks with limited amounts of data.

Additionally, previous studies tackle only superficially the task of visualization6, which is important to assess the limitations of such techniques from a radiological perspective and to provide a second opinion to radiologists. A deeper understanding of the radiological aspects could be helpful for further advances and to build trust among the medical community in light of a future practical application.

In the present work we address these issues. We present a deep learning architecture tailored to tuberculosis diagnosis. With this approach we reduce the computational and memory requirement significantly, without sacrificing the classification performance. We further discuss the results of the training through the use of saliency maps and grad-CAMs. These techniques, which, to the best our knowledge, were never applied to this problem, provide an approximate visual diagnosis that might be a useful additional tool for clinicians.

References

[1]. Anderson, L. et al. WHO Global tuberculosis report 2015. WHO Libr. Cat. Data **1**, 1689–1699 (2015).
[2]. Van't Hoog, A. H. et al. High sensitivity of chest radiograph reading by clinical officers. Int. J. Tuberc. Lung Dis. **15**, 1308–1314 (2011).
[3]. Melendez, J. et al. An automated tuberculosis screening strategy combining X-ray-based computer-aided detection and clinical information. Sci. Rep. **6**, 1–8 (2016).
[4]. Jaeger, S. et al. Automatic tuberculosis screening using chest radiographs. IEEE Trans. Med. Imaging **33**, 233–245 (2014).
[5]. Hwang, S., Kim, H., Jeong, J. & Kim, H. A Novel Approach for Tuberculosis Screening Based on Deep Convolutional Neural Networks. Proc. SPIE **9785**, 1–8 (2016).
[6]. Lakhani, P. & Sundaram, B. Deep Learning at Chest Radiography: Automated Classification of Pulmonary Tuberculosis by Using Convolutional Neural Networks. Radiology **284**, 574–582 (2017).
[7]. Islam, M. T., Aowal, M. A., Minhaz, A. T. & Ashraf, K. Abnormality Detection and Localization in Chest X-Rays using Deep Convolutional Neural Networks. CoRR abs/1705.0 (2017).
[8]. Lopes, U. K. & Valiati, J. F. Pre-trained convolutional neural networks as feature extractors for tuberculosis detection. Comput. Biol. Med. **89**, 135–143 (2017).