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Lungs Cancer Detection using Convolutional Neural Network

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***Abstract*: The evaluation of assessment is based on scrutinizing the process of using CNN for the detection of lung cancer. There is no doubt in saying that lung cancer is recognized as one of the most dreadful and killer disease in multiple developing counties and detecting cancer is still considered as a significant challenge. Cure and analysis of lung malignancy has been one of the most significant difficulties which many humans have been facing from last couple of years. The purpose of evaluating this research and solving this problem is to reduce the death rate by increasing the accuracy of lung cancer detection. The proposed model uses the CNN techniques from deep learning that can show more accurate results than previous technologies. The detection of lung cancer by using the CNN technique is the main goal as it also provides detection accuracy.**

***Keywords*: Deep learning, Image processing, CNN.**

1. Introduction

Lung cancer is considered as one of the ghastliest diseases in many countries around the world and its morality rate has been 19.35%. The early detection of cancer has been implemented with good rates in chest x-ray, sputum cytology, and magnetic resonance imaging technologies.

The detection process always means classifying the tumor into two classes comprising the non-cancerous tumor and the cancerous tumor. It has also been executed that the chances of surviving at the advance stage is very much less when it comes to comparing to the lifestyle and treatment to survive the cancer therapy when cancer is diagnosed at any early stage. It has also been evaluated that diagnosis system and mutual analysis can be easily improved with the appropriate implication of the image processing techniques [1].

There are so many researchers who have used image processing techniques in their studies or detecting the early stages of cancer which are also available in the literature. Still the hit ratio of the process of early-stage cancer is not improved significantly. There is no doubt in saying that neutral network has been playing an integral role in the recognition of numerous cancer cells between the normal tissues which is then providing an effective and efficient tool for appropriately building the assistive artificial intelligence-based cancer detection. The cancer treatment would be considered very effective when the tumor cells would be appropriately separated from the side of proper cell classification of the tumor cells and training would be done considering the neutral networks forms the foundation for the machine learning based cancer diagnosis techniques [1].

A. Research Motivation

Lung cancer is recognized as one of the most commonly diagnoses dangerous and dreadful cells and also known as one of the most perilous tissues of cancer which usually leads to fatality between males in 2019. The bronchi cancer tissues are considered to be the primary risk for the personal everyday lifestyle of many people around the world. Detecting lung cancer using the CNN is very important because early diagnosis of the cancer usually concentrates on detecting some of the symptomatic patients at very early stage so they get the best chance for the most effective and successful treatment which is very much needed in the era of technology and AI advancements because when the cancer care is inaccessible or delayed, there is a very low chance of survival and some higher costs of care as well [2].

B. Problem Statement

Lung cancer is a major issue that takes place in humans in large numbers. It is evaluated that lung cancer can be detected in a man is about 1 in 15 and in women have the risk of lung cancer is 1 in 17. Lung cancer is leading many people to death as it is evaluated that for men, the ratio of death is 46.7 per 100,000 persons than the women for 31.9 per 100,000 persons. It is the same for the black at 40.0 per 100,000 persons and for whites at 39.2 per 100,000 persons overall. It is needed to find a way for detecting lung cancer as it can help the majority of people to reduce the death rate and detect the cancer cells that eat a living person [3].

There are many techniques are already existed for the detection of lung cancer but there are still some limitations take place that increases the risk of failure and that lead to improper treatment. It is evaluated that the bronchial biopsy and bronchial brushing both are yielding a high percentage of the specimens which are positive with a rate of 65%; the post-bronchoscopy sputum specimens were considered to be less positive with a rate of 40%. The combination of bronchial biopsies and brushing will give optimum accuracy with an overall rate of %79 [4]. The CT scan is also a technique for lung cancer detection but it produces twice as many false reports as

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X-rays. The second CT scan will produce false-positive results for cancer detection in 33% of the patients. This problem has to be solved by all means by using the latest techniques and technology [5]. From previous research, it is also evaluated that computer-based system shows more accurate results which have implemented the technology of image detection as many hospitals in Iraq use the convolutional neural network-based techniques along with AlexNet architecture that provides accuracy in results. So, this concept will also be evaluated in this research paper and CNN will be integrated for the detection of lung cancer [6].

2. Literature Review

Emphasis was laid on scrutinizing the process of advanced lung cancer prediction based on the blockchain material utilizing the extended CNN through the contribution of Asadi and some of his research fellows. Lung cancer has been progressing rapidly so early detection is very critical for using the internet of things for the early stage of a lung cancer diagnosis. The training for the Internet of things devices for real-time is very critical because they always have IoT connectivity around the globe and significant trust in the accuracy of the model considering both of the data. The early detection of the disease would assist in saving hundreds of thousands of lives every year. According to the researchers, malignant growth was observed for the first time with the help of the picture-processing and some learning systems. Some of the major signs of lung cancer usually don't appear unless the disease has rapidly spread [7].

This is considered a time when medical attention becomes very challenging and important for treatment. Initially, the patients can find their fingers curving or their end rising or most importantly pan when they try to swallow which is usually followed by the contribution of a whistling sound, a weight gain in the face, hoarseness, upper chest swelling. Some of cancer's key signs comprise worsening or regular chest pain, rust-colored or bloody sputum, shortness of breath, and worsened hunger. According to the researchers, the lung CT image can be easily utilized for classifying and organizing the lung knobs and it can also assess the treatment level with the contribution of some ECNN features parameters entailing time intricacy and precision. They also have some irregular cells which can form a tumor. The researchers have finally executed that the novel and proposed approach in the process is ECNN.

3. Methodology

The lung cancer detection research paper will be evaluated by using the CNN methodology. The CNN comes from deep learning which is a convolutional neural network (ConvNet/CNN) as it is the class of deep neural networks that commonly applies to visual imagery analysis. The CNN has many convolutional layers which are all used for classification, image processing, and segmentation and it is also used for autocorrelated data.

The Proposed methodology mainly focused Convolutional, Pool and Fully connected layers to get the best result. CNN will be integrated with the algorithm of deep learning which takes an input of Lung cancers images which are openly available at Cancer Imaging Archive website [11]. 1000 Images of lung cancers were used int this proposed methodology for testing a training purpose.

The proposed methodology [See figure 1] performs:

1. Take input from database
2. Apply CNN model
3. Do feature extraction and feature classification

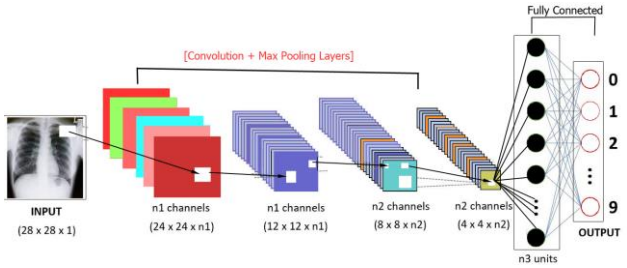

Fig. 1. Feature extraction and classification model

[3x3] image matrix is used to apply feature extraction to each pixel of an image, Convolutional layer create the activation map on each pixel. Max pool layer further zooms out the exactly result get after convolutional layer and store in pixels. Then finally we get the image classification data in the form of fully connected layer either it is malignant or benign.

This method will apply to each and every pixel of input image to get the better accuracy. Figure.2 is the prime data of image pixels where we applied featured extraction method using convolution and pooling layer and store it in fully connected layers.

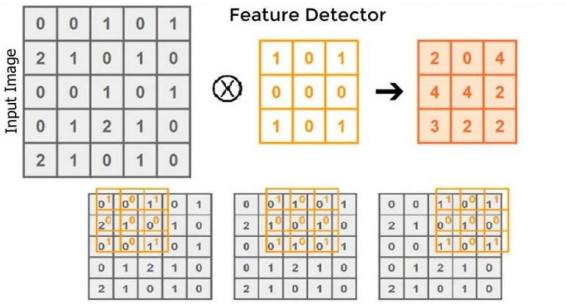

Fig. 2. Feature extraction

All the Project is performed in python where 600 images were used and testing and 400 images were used as training purpose. The system is trained which detect the presence of cancerous cells or tumors in the lung by using CT. System learnt to differentiate the benign and malignant data with high accuracy.

The architecture of the CNN will be considered as the beneficial factor which contributed to the research as formed based on the stack of all layers which are distinct and it transforms the volume of input into the volume of output such as holding scores of classes through those functions which are differentiable.

4. Conclusion

Lung cancer is a dangerous disease which is needed to be tackled by all means. Many previous technologies and some research show some gaps that they didn't fulfill high accuracy detection results. But, the proposed model [see fig. 1] is useful in lung cancer detection because of its high accuracy and helps in improving the accurate results of the tumor cells that reduce the death rate.

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