Chapter 13
Lung Cancer Detection Using Explainable Artificial Intelligence in Medical Diagnosis

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ABSTRACT

AI (artificial intelligence), IoT (internet of things), and CC (cloud computing) have all lately gained popularity in the healthcare industry, allowing radiologists to make better decisions. This research proposed a novel technique in lung tumor detection based on cloud-IoT in segmenting and classification using deep learning techniques. Using a cloud-based IoT module, the lung tumour dataset was gathered from multiple healthcare datasets. This data has been segmented using optimized fuzzy C-means neural network (OFCMNN). The pattern segmented area is attained by an optimized version. Then segmented pattern of lung cancer has been classified using ensemble of kernel multilayer deep transfer convolutional learning (KM-DTCL). The presented technique's performance was assessed using a benchmark image lung tumour dataset as well as lung MRI images. When compared to current strategies in the literature, the new method outperformed them in terms of accuracy, recall, precision, AUC, TPR, and FPR. The suggested method outperforms all of the photos in the application dataset in a variety of ways.

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1. INTRODUCTION

Lung cancer is identified as one of the significant causes of death worldwide (Shakeel et al., 2019). It is one of most risky tumours that can harm a person's health. Benefits of preceding forecasts' fuzzy logic will lead to a result-oriented analysis. Lung cancer survival is directly proportional to its progression after diagnosis. On the other hand, individuals have a higher success rate while they are young. Cancer cells are spread by the blood and lymph fluid surrounding lung tissues. Lung cancer is characterised by evolution of irregular cells that multiply as well as progress into a tumour (Abdullah et al., 2021). Lung cancer has uppermost death rate among other cancers. Cigarette smoke is responsible for about 85% of male lung cancer cases as well as 75% of female lung cancer cases. Lung cancer is one of worst diseases in underdeveloped countries, with a death rate of 19.4%. Lung cancer is one of significant lethal cancers in world, with lowest survival rate after diagnosis as well as an annual increase in number of deaths (Khalil et al., 2020). Fuzzy logic's advantages in early predictions causes to a result-oriented approach. The prognosis of lung cancer has a direct relationship with its prognosis. Individuals, have a higher success rate in early stages of life. Lymph flows through lymph veins, which then empty into lymph nodes in lungs as well as chest. Lung illness examination as well as treatment has become one of humanity's most significant challenges in recent years. Early tumour detection will ensure the survival of a large number of people all over the world (Alzubi et al., 2021). If lung imperfections are discovered early on, there is a chance that the diagnosis will be improved, saving lives and maybe lowering the number of fatalities per year. Blemishes - denseness with a size ranging from 2.9 to 30mm, with additional variations in their location, setting, sizing, form, juxta pleural connected to lung parenchyma, non-solid, strong and sub-strong. A lot of these can be found on a CT scan. CT is set aside for the initial examination of the flaws. Lung cancer cells are minimized by 20% in CT compared to upper body X-ray scanning, according to LCST (lung cancer cells testing routes). Lung cancer cells are also reduced by around 5-year death in CT compared to upper body X-ray scanning. The radiologist in charge of determining suspicious sores in form of lung blemishes in CT details is critical to proper use of CT testing. The pooling feature map is used as a feature representation in this part, therefore the characteristics of each layer are determined by the dimension. The scope of this project could be significant, especially for small lung defects. 30 5 percent of lung cancer cells had diameters of 10 mm or smaller when they were discovered on incidence shows in National Lung Testing Test at time of their finding. A CT scan of the entire lungs, reconstructed with one mm secure regions, yields around 9,000,000 lung voxels. Lung imperfections ranging in size from 4 to 10 mm occupy 77 to 1200 voxels, or maybe 0.00086 percent to 0.014 percent of lung level, challenging radiologists to identify all of them during search dimensions of 2 to 5 mins under perfect conditions. Lung cancer can also spread to lymph nodes in lower portion of neck. Lung cancer can spread to other body regions later on, such as liver, brain, or bones. DL is beneficial in predicting these dangerous diseases. The learning property of the convolution layer divides images into minor pixels boxes, resulting in pixels. DL conducts kernel as well as filtering operations on data in this layer (Khatri et al., 2020). Consequence of previous layer is input. All new specifications are discarded in pooling layers, resulting in smaller feature maps. Goal of this short essay is to examine our current understanding of lung blemish location on CT scans as we go into period of traditional CT-based lung cancer cell monitoring. After performing a CT scan on a patient, radiologists must examine data in form of photos based on nodule morphology as well as procedure. This should be done in accordance with clinical techniques and should not include factors such as exhaustion or misinterpretation of information. The radiologists are required to interpret the information diagnosed in order to improve the data