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Applying CNN on Lung Images for Screening Initial Cancer Stages

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***Abstract*— Cancer is the most common disease nowadays, in particular the lung cancer is often diagnosed in many individuals. There are various factors that contribute to cancer in humans, but among them tobacco smoking remains as a key contributor. Smoking is a primary cause, but many other variables, such as second-hand smoke, industrial pollutants, asbestos exposure, and so on, can also cause cancer. These all need to be filtered by lungs, as lungs always need to be working, unlike other organs in the body lungs does not have any rest so it gets effected early than all other body organs, in such cases it has to be examined carefully and clearly for many times to conclude whether it is affected with cancer. This effort is made to make such simple support for doctors in designing a CAD system for identifying the presence of tumor in lungs, this model has high accuracy rate in identifying the problem. CNN is a reliable algorithm for finding such minute problems in CT Scan image of lung to confirm the disease. Lung CT images were used in this study. Training accuracy of our model is 96.11% and the validation accuracy is 97.8%.**

Keywords*— *Computer Aided Design, Convolutional Neural Networks, Computed Tomography, Deep Learning, Lung Cancer

I. INTRODUCTION

Lung cancer is a type of cancer that starts in the lungs and expands to various parts in the body. Cancer in the lungs is the most widely recognized sort of disease that kills people. The assumption is that genetic factors must put certain individuals at higher risk for cellular breakdown in the lungs after openness to cancer-causing agents [6]**.** Lung cancer was diagnosed in an approximated 171,600 people in the United States in 1999 (94,000 men and 77,600 women), with 158,900 people dying as a result of the disease. As a safety measure, the United States Preventive Services Task Force (USPSTF) indicates that high-threat adults be checked yearly with low-dose computed tomography. (CT) [23]. For the reasons stated above, it is necessary to deploy a CAD system to assist clinicians in identifying lung cancer as early as possible, not only recognising the nodule but doing so with high accuracy. Our aim is to recognize the presence of cellular breakdown in the lungs in understanding CT images of lungs with and without early phase cellular breakdown in the lungs, using a binary classification issue. To create an accurate classifier, this research work attempts to leverage different approaches from computer vision and deep learning, specifically convolutional neural networks. This research study has used a dataset from Kaggle and constructed a CNN model, trained for the purpose of Lung Cancer detection.

II. BACKGROUND

In the lung cancer diagnosis, computed tomography (CT) is needed to spot the pulmonary nodules. To detect and categorise pulmonary nodules in clinical CT scans, we need to employ a well-trained deep learning system, as deep learning algorithms have recently been recognised as a promising tool in the medical field.[4]

This study was designed to aid doctors in making decisions regarding a patient's health and increase informed patient consent by providing a thorough grasp of the risks involved in treatment procedures based on the patient's condition. By gathering information about the patient's state, we can also save some expensive resources that aren't required for the patient. Despite ongoing forward leaps in analytic strategies, unobtrusive changes, and theoretical therapies, cellular breakdown in the lungs patient results stay poor; subsequently, a more profound comprehension of hazard variables might affect local area level preventive drives [1].

Convolutional neural network (CNN) was the primary deep learning technique to acquire widespread attention for their superior performance in AI applications [16]. Several medications developed as a result of these research are now approved for the treatment of certain types of lung cancer. Current lung cancer biology research using cell lines, tumour samples, and animal models, along with knowledge of the lung cancer genome, will bring about a superior comprehension of the illness and new remedial options for patients [21].

Victor [10] employed a deep learning model and achieved an accuracy of 88.4%. Jan et al. [18] A morphological and circular filter-based lung segmentation approach was proposed. Later, they have used CNN approach and got an accuracy of 84.62%. Lyu. [11] developed a Multi-Level