

## Article

# A Transfer Learning Approach with a Convolutional Neural Network for the Classification of Lung Carcinoma

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**Abstract:** Lung cancer is among the most hazardous types of cancer in humans. The correct diagnosis of pathogenic lung disease is critical for medication. Traditionally, determining the pathological form of lung cancer involves an expensive and time-consuming process investigation. Lung cancer is a leading cause of mortality worldwide, with lung tissue nodules being the most prevalent way for doctors to identify it. The proposed model is based on robust deep-learning-based lung cancer detection and recognition. This study uses a deep neural network as an extraction of features approach in a computer-aided diagnosing (CAD) system to assist in detecting lung illnesses at high definition. The proposed model is categorized into three phases: first, data augmentation is performed, classification is then performed using the pretrained CNN model, and lastly, localization is completed. The amount of obtained data in medical image assessment is occasionally inadequate to train the learning network. We train the classifier using a technique known as transfer learning (TL) to solve the issue introduced into the process. The proposed methodology offers a non-invasive diagnostic tool for use in the clinical assessment that is effective. The proposed model has a lower number of parameters that are much smaller compared to the state-of-the-art models. We also examined the desired dataset's robustness depending on its size. The standard performance metrics are used to assess the effectiveness of the proposed architecture. In this dataset, all TL techniques perform well, and VGG 16, VGG 19, and Xception for 20 epoch structure are compared. Preprocessing functions as a wonderful bridge to build a dependable model and eventually helps to forecast future scenarios by including the interface at a faster phase for any model. At the 20th epoch, the accuracy of VGG 16, VGG 19, and Xception is 98.83 percent, 98.05 percent, and 97.4 percent.

**Keywords:** lung carcinoma; VGG 16; VGG 19; Xception; TL



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## 1. Introduction

Cancer is a significant concern across the globe, and it is the second foremost reason for death. Lung cancer stands in third place among cancer deaths. Lung cancer is broadly classified into small and non-small-cell lung cancer. Various subtypes in non-small-cell lung cancer are adenocarcinoma, squamous cell cancer, and large cell carcinoma. Non-small-cell lung cancer is frequently observed, but small cell lung cancer spreads faster and is often fatal. Changes to the affected person's voice, chest pain, shortness of breath, and wheezing are a few symptoms to list, and more painful symptoms also prevail [1,2]. Chemotherapy, targeted drugs, and immunotherapy are the treatments that have been approved over the decades [3].

Google Trends show the potential research going on in the field of cancer, and this is graphed in Figure 1. Several progressive methods are being devised for earlier detection with the help of artificial intelligence concepts.