UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

Informatics Institute of Technology

In Collaboration With

University of Westminster, UK

Anti-Carcinogenictor: Detection and Segmentation of Pulmonary Nodules using Deeply Supervised CNNs and CT Imaging

A dissertation by

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w17903204/20191067

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This dissertation is submitted in partial fulfillment of the requirements for BENG (Hons) Software Engineering with Industrial Placement degree at the University of Westminster.

May 2023

ABSTRACT

The timely and precise identification of pulmonary nodules is of paramount importance in the diagnosis and management of lung cancer. The task at hand poses considerable difficulties owing to the intricate and nuanced characteristics of the nodules, in conjunction with the constraints of conventional image analysis methodologies. The necessity for an improved and dependable methodology towards this issue is apparent, given its intricacies.

A new approach was devised to tackle this matter, which involved the utilization of Convolutional Neural Networks (CNNs). The distinctive structure of Convolutional Neural Networks (CNNs), comprising of convolutional layers, pooling layers, and fully connected layers, has been effectively utilized to process the grid-like data present in medical images. The convolutional neural networks (CNNs) utilized in this methodology exhibited the ability to perform unsupervised learning and extract features from the unprocessed image data, resulting in a reduction of information loss that is frequently encountered in manual feature extraction techniques. The utilization of convolutional neural networks (CNNs) conferred a notable benefit in the identification and isolation of the complex characteristics of pulmonary nodules, which are frequently disregarded by alternative techniques.

The CNN model's performance was assessed utilizing various metrics in the field of data science. The model exhibited exceptional accuracy in identifying and isolating nodules in various datasets, thereby validating its effectiveness and capacity for generalization. The utilization of the model necessitates significant computational resources and a vast amount of training data. However, its exceptional performance validates its efficacy in the arduous undertaking of detecting and segmenting pulmonary nodules.

Keywords: Convolutional Neural Networks, Pulmonary Nodules, Lung Cancer, Image Segmentation, Computer-Aided Detection.

Subject Descriptors: Medical Imaging, Artificial Intelligence, Deep Learning, Computer Vision, Health Informatics.