Detection of Benign and Malignant Lung Nodules in 3D Volumes Generated From Thoracic Computed Tomography Scans Leveraging Artificial Intelligence, Year 2

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Lung cancer is the second most diagnosed form of cancer in both women and men and is the leading cause of cancer death as it accounts for 1 in 4 cancer deaths. Radiologists have to examine anywhere between 60 and 320 thoracic CT slices per patient while looking for any abnormality. This leads radiologists to be at risk of eye fatigue which poses a threat to the quality of the patient's care. In order to address this issue, Artificial Intelligence (AI) was utilized for detecting and classifying benign and malignant lung nodules in 3-Dimensional volumes concatenated from thoracic CT scans, with improved accuracy compared to that of a human. Two 2.5D architectures of Convolutional Neural Networks (CNN), 2.5D-1 and 2.5D-2, were implemented. Using Matplotlib, line graphs were constructed to visualize the different learning rates (0.001-0.5) for each of the 2.5D architectures. After further data analysis, it was seen that the 2.5D-1 CNN yielded the highest accuracy of 88.91% in the detections and classifications of the lung nodules which is still slightly less than what is required for medical usage, at least 90% accuracy. However, it is evident that with these findings, by modifying and further researching different architectures, AI in general and CNNs, in particular, have significant potential in revolutionizing the healthcare industry. Overall, the 2.5D architectures have a higher accuracy to that of 2D CNNs through leveraging 3D volume reconstruction and slicing along random axes thus preparing for a wider perspective of lung scans.

Awards Won:
Fourth Award of $500