A Lightweight Attention-Enhanced Deep Learning Model Based on MobileNetV2 for Lung Cancer Detection

ABSTRACT

Today, cancer poses a significant challenge to health care, and the impact of mortality is growing and continuing to climb worldwide. Because lung cancer has a high death rate and a high probability of being detected later in the course of the disease, it is the most deadly of all malignancies. The frequency and diagnosis of lung cancer are rising significantly, and because it is often detected too late, survival chances are frequently poor. Based on cellular features, lung cancer can be divided into two major groups: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC). There are four stages of lung cancer, and the prognosis and available treatments are quite restricted. The framework employs a lightweight MobileNetV2 archi tecture with an explicit attention mechanism to learn a better representation of spatial and channel features while maintaining a constant level of computational load through a depthwise separable convolutional layer/dimension. The framework was developed using CT scan data sourced from Kaggle, organized in four classes: adenocarcinoma, large cell carcinoma, squamous cell carcinoma, and normal tissue. Data Augmentation techniques like gamma correction, bilateral filter and normalize have fur ther demonstrated the robustness of the proposed framework, enabling it to operate effectively and efficiently and helping to justify the classification accuracy of 96% in real-time clinical settings.