

CNN-Based Lung Cancer Detection from CT Scan and X-Ray Images: A Deep Learning Perspective

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Abstract: Lung cancer remains the leading cause of cancer-related deaths globally, accounting for approximately 2.2 million new cases per year (WHO, 2024). Early and accurate detection is critical — the five-year survival rate for localised lung cancer is 59%, compared to only 6% when diagnosed at a distant stage. This paper presents an intelligent, web-based Lung Cancer Detection System that leverages Transfer Learning on the MobileNetV2 Convolutional Neural Network (CNN) architecture to analyse both Chest X-ray images and CT scan images with high accuracy. The system accepts flexible input — either X-ray alone, CT scan alone, or both simultaneously — with a weighted confidence fusion strategy that improves overall diagnostic reliability. The backend is powered by Flask (Python), which handles image pre-processing (resizing to 224×224 pixels, RGB normalisation), model inference, and weighted confidence calculation. Two independently trained MobileNetV2 models — one for X-ray images (87.5% accuracy) and one for CT scans (91.2% accuracy) — generate probability scores that are combined with patient risk factors (age, smoking history, family history) to produce a final diagnosis with a risk level classification (High/Moderate/Low). A key innovation of this project is the integration of a custom Blockchain module that immutably records every diagnosis. Using SHA-256 cryptographic hashing and Proof-of-Work (PoW) mining with difficulty level 3, each diagnosis is stored as a block in a verifiable chain, providing a tamper-proof audit trail for medical records. The system achieves an end-to-end response time of 2–5 seconds

Keywords: Lung Cancer Detection, MobileNetV2, Transfer Learning, Convolutional Neural Network, Blockchain, SHA-256, Proof-of-Work, Medical Image Analysis, Flask, Deep Learning, Computer-Aided Diagnosis.

