

Automated Lung Disease Detection from X-ray and CT Scan Images Using Deep Learning: A CNN-Based Approach

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Abstract: Lung infections are a major global health concern, requiring early and precise diagnosis to improve treatment outcomes. This study explores the application of deep learning, particularly Convolutional Neural Networks (CNNs), in detecting lung diseases using chest X-ray and CT scan images. The proposed system aims to classify conditions such as pneumonia, tuberculosis, lung cancer, and COVID-19 by analyzing medical images. The framework includes key components such as data acquisition, preprocessing, neural network model development, and performance evaluation. Ethical considerations, including data privacy and model transparency, are incorporated to ensure responsible AI implementation in healthcare.

To enhance accuracy, the research utilizes a combination of deep learning models, including sequential, functional, and transfer learning techniques. Preprocessing steps such as image denoising and data augmentation are applied to improve model robustness. The study highlights the potential of AI in automating lung disease diagnosis, reducing dependency on manual interpretation, and assisting healthcare professionals in making faster and more reliable decisions. Future advancements may include real-time deployment, integration with clinical decision support systems, and continuous learning models for improved diagnostic efficiency. This research contributes to the growing field of AI-driven medical imaging, offering a promising solution for early and accurate lung disease detection.

Keywords: Deep Learning, Convolutional Neural Networks, Lung Disease Detection, X-ray Imaging, Medical Image Processing

