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A Deep Learning Approach for Lung Infection Detection in X-Ray Imaging

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Abstract: *Lung diseases represent a significant global health burden, necessitating early and accurate diagnostic methods to improve patient outcomes. This paper presents a theoretical framework leveraging deep learning, specifically Convolutional Neural Networks (CNNs), to automate the detection of various lung infections, including pneumonia, tuberculosis, lung cancer, and COVID, in X-ray images. By training CNNs on diverse datasets, the framework aims to create a robust system that can detect intricate patterns associated with lung diseases, potentially supporting radiologists in making faster, more reliable diagnoses.*

The proposed framework addresses essential components such as data acquisition, preprocessing, network architecture optimization, and an effective training-validation process. Additionally, ethical considerations, including data privacy, fairness, and interpretability, are integral to the approach to ensure responsible AI usage in healthcare. While this study is primarily theoretical, it sets a foundation for practical applications that could transform lung disease diagnosis, enabling earlier interventions, improving patient care, and advancing global health outcomes through enhanced collaboration between AI systems and healthcare professionals.

Keywords: X-ray, lung disease, pneumonia, tuberculosis, and deep learning.