ABSTRACT

The present work involves the use of deep learning models, particularly Convolutional Neural Networks (CNNs), to detect critical lung diseases such as pneumonia, tuberculosis, and lung cancer through the analysis of chest X-ray and CT scan images. CNNs have emerged as robust tools for medical image analysis due to their ability to automatically extract hierarchical features, making them ideal for complex tasks like disease detection. This study leverages well-known architectures, including VGG16 and VGG19, combined with specially designed sequential and functional models to improve classification accuracy.

The models were trained on open-source datasets containing real-world medical images to ensure diversity in lung abnormality cases. To enhance model performance and robustness, data augmentation techniques were employed. Given the limited availability of labeled medical data, augmentation artificially increases the training set size, allowing the models to generalize better to unseen data. The images were rescaled, shear-transformed, and horizontally flipped to simulate different orientations and variations commonly encountered in real-world X-ray and CT scans. This approach enhances the model's ability to detect diseases across various datasets by reducing sensitivity to changes in orientation, scale, and noise.

The results of this study demonstrate that early detection of lung diseases has significantly improved through the integration of advanced CNN architectures and augmentation strategies. Notably**,** VGG19 achieved an impressive accuracy of 99.4%, highlighting its effectiveness in precise lung disease classification. The high accuracy of the models underscores their potential for early diagnosis, which is crucial in improving treatment outcomes for diseases like pneumonia, tuberculosis, and lung cancer. Additionally, this research emphasizes the growing role of deep learning in clinical practice, providing not only highly accurate but also timely diagnostic support to medical professionals.