**XAI-Assisted Deep Learning for Pneumonia Detection**

### ****Introduction****

Pneumonia is a severe respiratory infection requiring early detection. While CNN-based deep learning models improve diagnosis, they lack interpretability. Explainable AI (XAI) enhances model transparency, making predictions more trustworthy for medical professionals.

### ****Problem Statement****

This project evaluates deep learning models for pneumonia detection using chest X-rays. To address the challenge of black-box decision-making, XAI techniques are integrated to improve model interpretability and reliability in medical diagnostics.

### ****Objectives****

The key objectives include preprocessing chest X-ray images for improved model training, enhancing transparency using SLIC, Quickshift, and Quickshift with Noise, and expanding the dataset to improve generalization and adaptability.

### ****System Framework****

A fine-tuned the models is used for pneumonia detection. Superpixel segmentation methods, including SLIC and Quickshift, help focus on critical lung regions, while LIME and Grad-CAM provide explainability by visualizing model decisions.

### ****Progression****

Data preprocessing, including image resizing, normalization, and augmentation, has been completed. Model training and evaluation are ongoing, with superpixel segmentation and XAI integration in progress to enhance interpretability.

### ****Algorithms Used****

SLIC segments images into meaningful superpixels, Quickshift clusters lung regions based on pixel density, and Quickshift with Noise refines segmentation in noisy X-ray images, collectively improving pneumonia detection accuracy.

### ****Conclusion****

Integrating XAI with deep learning enhances pneumonia detection by improving transparency and trust. Future work will focus on refining segmentation, dataset expansion, and optimizing the model for reliable clinical application.

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