**Synthesized Conclusion:**

Deep learning models can accurately diagnose lung diseases like COVID-19 and Tuberculosis from chest X-rays (CXRs), with accuracies ranging from 98% to 99.9%. This high performance is driven by advanced preprocessing methods such as

**lung segmentation**, which significantly improves model reliability , and

**super-resolution**, which enhances low-quality images.

The application of these AI tools is broadening from single-disease detection to the

**joint diagnosis** of multiple conditions and their use as general screening tools to differentiate "normal vs. abnormal" cases, which can reduce clinical turnaround times. Although challenges like imbalanced datasets persist , these systems provide highly effective, fast, and reliable decision-support tools for clinicians.

1. *COVID-19 Detection Using Deep Learning Algorithm on Chest X-ray Images* (Biology, 2021) :

Conclusion :

Modified MobileNetV2 significantly outperforms other CNNs, achieving **98% classification accuracy**.

Model is efficient in computation (shorter compilation time) and highly reliable for COVID-19 detection.

Provides a promising tool for rapid diagnosis in healthcare settings.

1. *Deep learning for distinguishing normal versus abnormal chest radiographs and generalization to two unseen diseases: tuberculosis and COVID-19* (Scientific Reports, 2021):

Conclusion:

AI system reliably distinguishes **normal vs abnormal** CXRs.

Generalizes well to **unseen TB** (AUC up to 0.97), but **less accurate for COVID-19** (AUC ~0.65– 0.68).

In workflow simulation, abnormal case turnaround was reduced.

Supports the idea that AI can be used as a general screening tool, not just for specific diseases.

1. *COVID-19 Diagnosis from Chest X-ray Images Using a Robust Multi-Resolution Analysis Siamese Neural Network with Super-Resolution Convolutional Neural Network* (Diagnostics, 2022):

Conclusion:

Proposed **COVID-SRWCNN** reconstructs high-quality CXRs and extracts meaningful features for improved classification.

Outperforms existing CNN and state-of-the-art models on public datasets.

Demonstrates robustness even with low-quality datasets.

Concludes that **super-resolution + wavelet multi-resolution analysis** is a powerful approach for medical imaging tasks.

Suggests potential applications beyond COVID-19, in other pneumonia-related illnesses.

1. Reliable Tuberculosis Detection using Chest X-ray with Deep Learning, Segmentation and Visualization:

Conclusion:

The study successfully demonstrates a transfer learning approach for the automatic detection of TB from chest radiographs. It concludes that

**segmenting the lungs** from the X-ray before classification significantly improves performance across all tested CNN models. While the best model (ChexNet) on whole X-rays achieved 97.07% accuracy, the best model (DenseNet201) on segmented lungs reached

**99.9% accuracy**. The Score-CAM visualization confirmed that segmentation forces the models to learn from the relevant lung regions, making the diagnosis more reliable and robust. The proposed method offers a state-of-the-art, fast, and highly accurate diagnostic tool that can aid in the timely diagnosis of TB

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1. Joint Diagnosis of Pneumonia, COVID-19, and Tuberculosis from Chest X-ray Images: A Deep Learning Approach:

Conclusion:

The study successfully developed a multiclass CNN that can effectively detect COVID-19, pneumonia, and tuberculosis from chest X-rays with a high average validation accuracy of

**98.72%**. The model outperformed similar state-of-the-art techniques for joint disease diagnosis and can serve as a valuable clinical decision support tool for healthcare experts. A major limitation acknowledged is the

**imbalanced dataset**, which may have led to slightly lower accuracy for the COVID-19 class due to fewer instances. Future work will focus on using dataset balancing techniques like SMOTE and exploring transfer learning with pre-trained models to further improve the model's robustness and accuracy.

1. A Robust Tuberculosis Diagnosis Using Chest X-Rays Based on a Hybrid Vision Transformer and Principal Component Analysis:

Conclusion:

The research introduced a highly effective hybrid CAD system for TB diagnosis that outperforms existing methods. The study concludes that the combination of a

**Vision Transformer (ViT) for feature extraction, PCA for dimensionality reduction, and an ML classifier (specifically RF, XGB, or AdaBoost)** yields the best results, achieving an exceptional accuracy of **99.84%**. This hybrid approach effectively leverages the deep feature representation power of ViT and the classification efficiency of traditional ML models. The developed system can be integrated into clinical workflows as a reliable decision-support tool to assist radiologists, streamline the diagnostic process, and improve patient outcomes by enabling faster and more accurate TB detection.