# Screen CXR: A Novel Deep Learning-Based Multi-Model Pipeline for Detection of Any Lung Tissue Disease Through Automatic Chest X-Ray Image Analysis

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Telemedicine & remote diagnosis using Computer-Aided Detection hold the key to timely medical treatment for millions of people, in absence of radiologists in remote regions. Unfortunately, the unavailability of large CXR image datasets (>50000) on lung diseases, has rendered current CADe models impractical for real-world application due to their low disease prediction accuracy & limited detection scope. Screen CXR is a one-stop automatic deep learning based diagnostic tool for detection of any lung tissue disease using Chest X Rays, capable of localizing & marking all suspicious lesions & trainable in less than 326 images. First, pre-processing steps like noise removal, contrast enhancement, image sharpening, image augmentation & semantic segmentation using UNET are performed on the uploaded CXR image. To prevent the ribs & clavicle from blocking lung abnormalities, we trained a Massive-Training-Artificial Neural Network which suppresses the bones & increases nodule visibility by 85%. Through successive training, a convolutional autoencoder was trained to perform selective feature extraction, i.e. identify disease patches in a CXR & extract majority features from that region solely, which helped isolate the target area features for the classifier & achieve better accuracy even in less data. The disease classification is then performed by a self-encoded VGG16 model. At last, the model triangulates all lung abnormalities using CAM & object detection. This analytic pathway successfully classified the 5 diseases it was trained on with 98% accuracy as Proof-Of-Concept upon testing. As this model is trainable on easily curatable small datasets & is based on advanced feature extraction processes, it can be trained & used for detection of any lung disease.

**Awards Won:**