**Abstract**

This paper introduces two innovative multi-label classification methods that utilize hierarchical taxonomy of labels to improve the diagnostic accuracy of lung diseases from chest X-rays. These diseases are often challenging to distinguish due to their similar characteristics, even for seasoned radiologists. The first method, termed as the ``logit'' technique, adjusts the neural network logit outputs based on the hierarchy of class relationships. The second method, termed as ``loss'', integrates these hierarchical relationships directly into the loss function. We apply these methods to categorize lung abnormalities in chest X-rays, using three publicly available datasets - CheXpert, PADCHEST, and NIH for evaluation. The ``logit'' and ``loss'' techniques consistently surpass the standard approach in terms of performance metrics such as accuracy, AUC, and F1 scores. Additional statistical measures, including Cohen's d, Cohen's kappa, t-statistics, p-value, and Bayes factor further validate these performance enhancements.

**KEYWORDS**: Chest radiography, hierarchical classification, disease taxonomy, multilabel classification, conditional loss function, diagnostic errors, machine learning, medical imaging