**Abstract**

This paper introduces two innovative multi-label classification methods that utilize the 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 the ``logit'' technique, adjusts the neural network logit outputs based on the hierarchy of class relationships. The second method, termed "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. In comparison to conventional approach, both the ``logit'' and ``loss'' methods demonstrate consistent improvements across various performance indicators, including a 12% and 11% increase in accuracy, a 13% and 10% increase in AUC, and a 24% and 12% increase in F1 scores, respectively. 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