

Proprietary vs Open-Source Radiomic Platform for Lung Cancer Diagnosis

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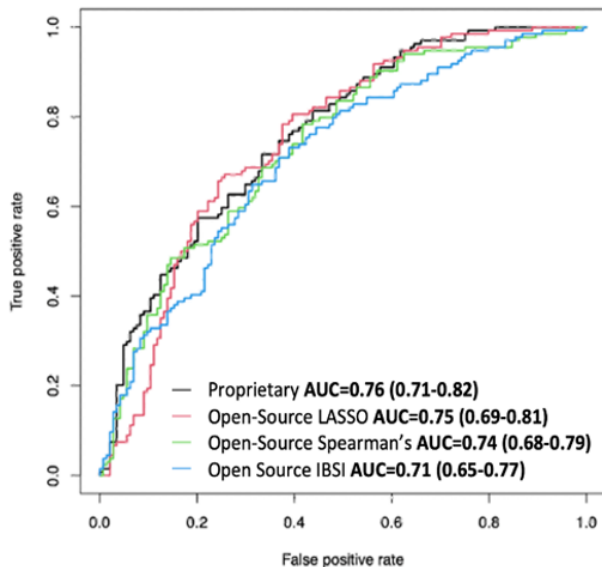
Background: Radiomics has shown promise in improving risk stratification of indeterminate pulmonary nodules (IPNs) with many platforms available, but with no head-to-head comparisons. Our study aimed to compare HealthMyne, a proprietary radiomic feature extractor, with PyRadiomics, an open-source feature extractor on diagnosis of lung cancer in IPNs.

Methods: Utilizing proprietary HealthMyne radiomic feature extractor, we previously created a validated radiomic signature. Open-source PyRadiomics feature extractor was used to develop three different radiomic signatures based on method of feature selection: Biomarker Standardization Initiative (IBSI) equivalent features, Spearman's correlation selected, and Least Absolute Shrinkage and Selection Operator (LASSO) regression selected. Radiomic models were trained on an internal cohort ($n = 161$) and externally validated on 3 cohorts ($n = 278$). We compared radiomic signatures by Area Under the Receiver Operating Characteristic Curve (AUC) estimates. We combined Mayo model score to the best open-source signature and proprietary signature making clinical radiomic models (ClinRad). The ClinRad models' diagnostic accuracies were evaluated by their AUC and clinical improvements by bias-corrected clinical net reclassification indices (cNRIs) using 200 repeated 3-fold cross validation and adjustment of prevalence rate of 0.33.

Results: Proprietary radiomic signature AUC was 0.76 (0.71-0.82), while open-source signature AUC was 0.71 (0.65-0.77) for IBSI model, 0.74 (0.68-0.79) for Spearman's correlation, and 0.75 (0.69-0.81) for LASSO. Mayo scores were added to open-source LASSO model, which performed best, forming a ClinRad model with AUC of 0.80 (0.74-0.86), identical to proprietary ClinRad AUC. Both ClinRad models showed clinical improvement compared to Mayo alone, with proprietary ClinRad model achieving cNRI of 0.09 (0.02-0.15) for benign and 0.07 (0.00-0.13) for malignant, and open-source ClinRad achieving cNRI of 0.09 (0.02-0.15) for benign and 0.06 (0.00-0.12) for malignant.

Conclusion: Open-source platform diagnostic accuracy and improvement in risk stratification for IPNs was nearly identical to a proprietary platform; proving it to be an accurate, accessible platform.

ROC Curves for Radiomic Signatures



ROC Curves for Integrated Clinical Radiomic Models (Mayo + Radiomic Signatures)

