

GRID SEARCH–OPTIMIZED XGBOOST FOR MULTI-CLASS LUNG CARCINOMA CLASSIFICATION USING HISTOPATHOLOGICAL IMAGES

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Accurate classification of lung carcinoma from histopathological images is critical for early diagnosis and treatment planning. This study presents a Grid Search optimized XGBoost classifier for multi-class lung cancer classification using 11,580 image patches extracted from 300 Whole Slide Images. Gradient-based edge detection techniques with the Sobel and Scharr operators are employed for image enhancement. Systematic hyperparameter optimization improves model stability and generalization. Experimental results demonstrate strong discriminative performance across Lung Adenocarcinoma, Lung Squamous Cell Carcinoma, and Non-Malignant classes. The classification has been validated by learning curves, confusion matrix, and ROC analysis with an accuracy value of 98%. The proposed framework offers an efficient and interpretable solution for computer-aided histopathological lung cancer diagnosis.
