"Radiomics-Based Classification of Glioblastoma Using MRI Features"

Abstract:
This study investigates the application of radiomic features extracted from multi-parametric MRI to classify glioblastoma (GBM). By engineering interpretable quantitative features from T1-weighted and FLAIR sequences, we trained a logistic regression model to distinguish between tumor core, edema, and necrotic regions. The pipeline provides a basis for non-invasive tumor characterization and monitoring.

Introduction:
Glioblastoma is the most aggressive form of primary brain tumor. Traditional diagnostic procedures rely heavily on manual segmentation and visual inspection. Radiomics offers an alternative by quantifying imaging phenotypes for pattern recognition and predictive modeling.

Methods:
Thirty patients with confirmed GBM underwent pre-operative MRI. From T1-weighted and FLAIR images, 120 radiomic features (first-order statistics, shape descriptors, texture metrics) were extracted per tumor region. A logistic regression classifier with L1 regularization was trained to differentiate between tumor core, edema, and necrotic regions using cross-validation.

Results:
The classifier achieved an overall accuracy of 82% on held-out data, with the highest precision in identifying necrotic regions. Texture features from FLAIR contributed most significantly to performance.

Discussion:
While simple in design, this radiomics-based approach demonstrates the promise of interpretable feature engineering in brain tumor imaging. Future extensions include survival prediction and integration with genomic profiles.