CASE STUDY #1

Extracting Prognostic Signals from Longitudinal Glioblastoma MRI Using Outcome-Driven Radiomics

Project Type

Independent outcome-driven re-analysis of a public longitudinal glioblastoma imaging cohort (LUMIERE).

Problem

A public longitudinal MRI radiomics dataset with expert RANO assessments and overall survival existed, but analyses were largely descriptive. No longitudinal survival-oriented radiomics model or compact prognostic imaging signature was available for patient risk stratification.

Dataset

1. Public LUMIERE glioblastoma cohort
2. ~90 patients
3. Longitudinal FLAIR MRI radiomics
4. Overall survival available
5. Multiple timepoints per patient

Solution

Performed an independent outcome-driven re-analysis converting raw longitudinal radiomics into a survival-ready modeling framework with feature reduction, survival modeling, validation, and clinical interpretation.

What I Delivered

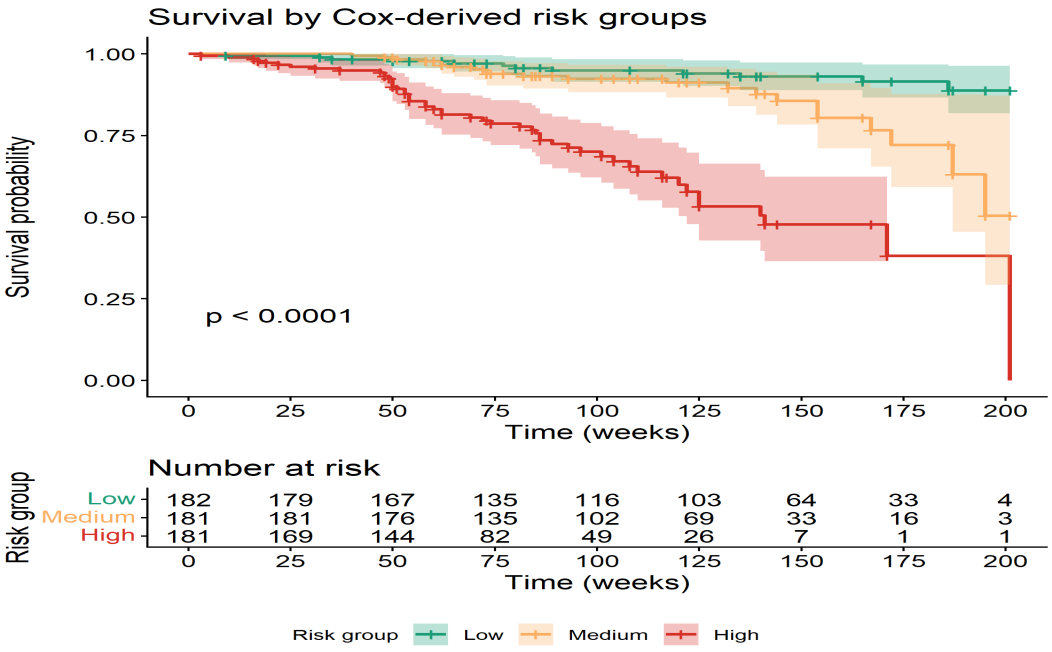
1. Survival-ready longitudinal dataset
2. Compact multivariable Cox model
3. Risk stratification curves
4. Time-dependent discrimination
5. Calibration & prediction error assessment
6. Decision-curve clinical utility analysis

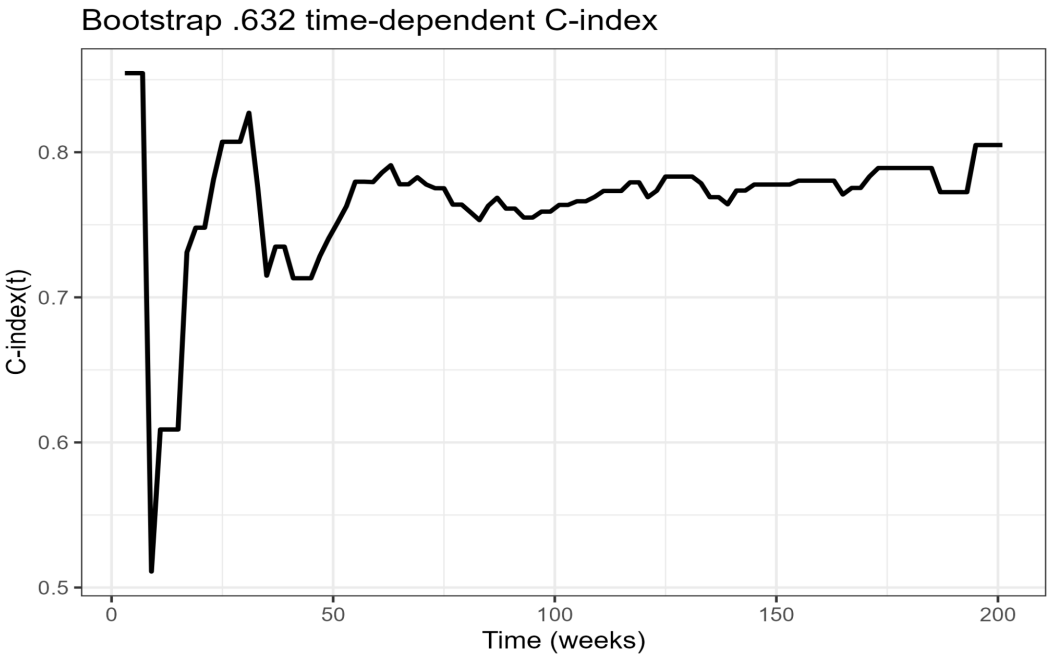
Key Results

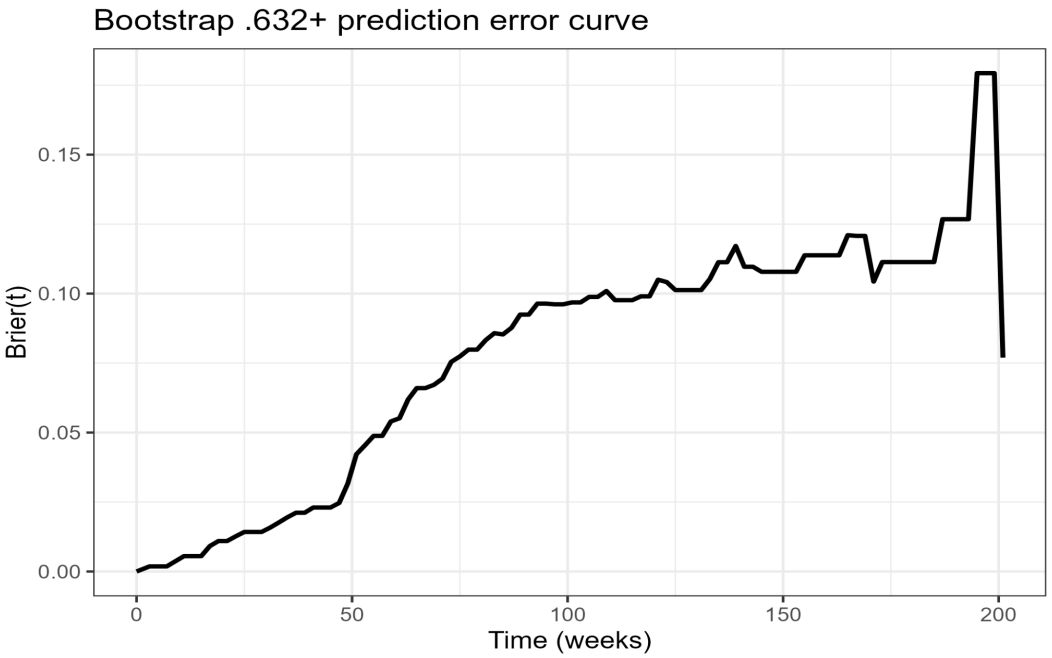
1. Compact 3-feature radiomics signature + age
2. Clear separation of low / medium / high-risk groups
3. Stable time-dependent discrimination (~0.75–0.80)
4. Good calibration for 1-year survival

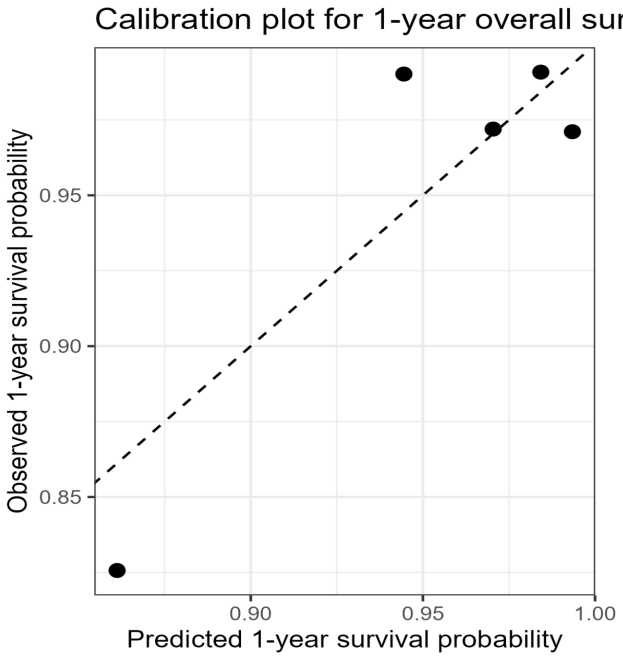
5 Positive clinical net benefit across thresholds

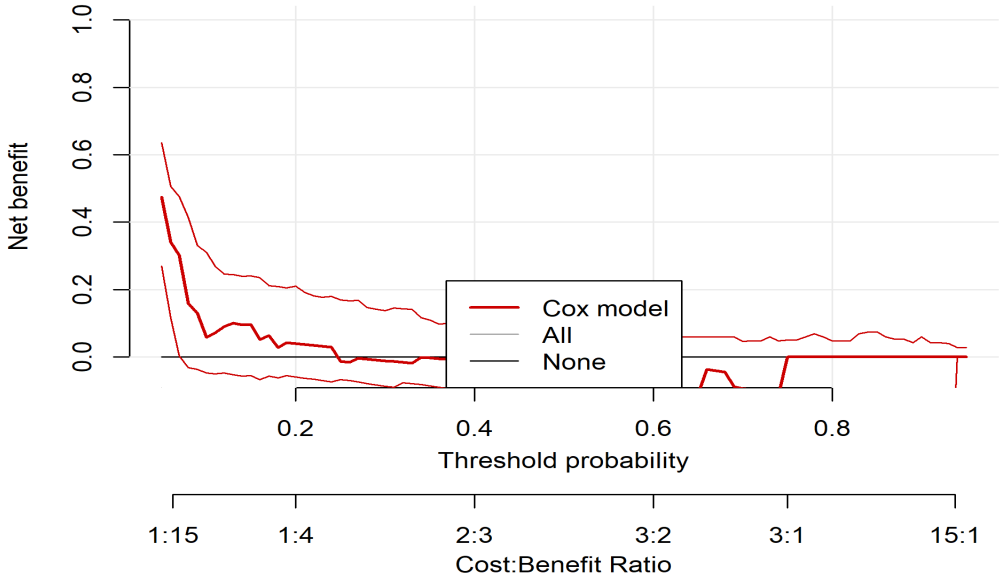
Representative Figures

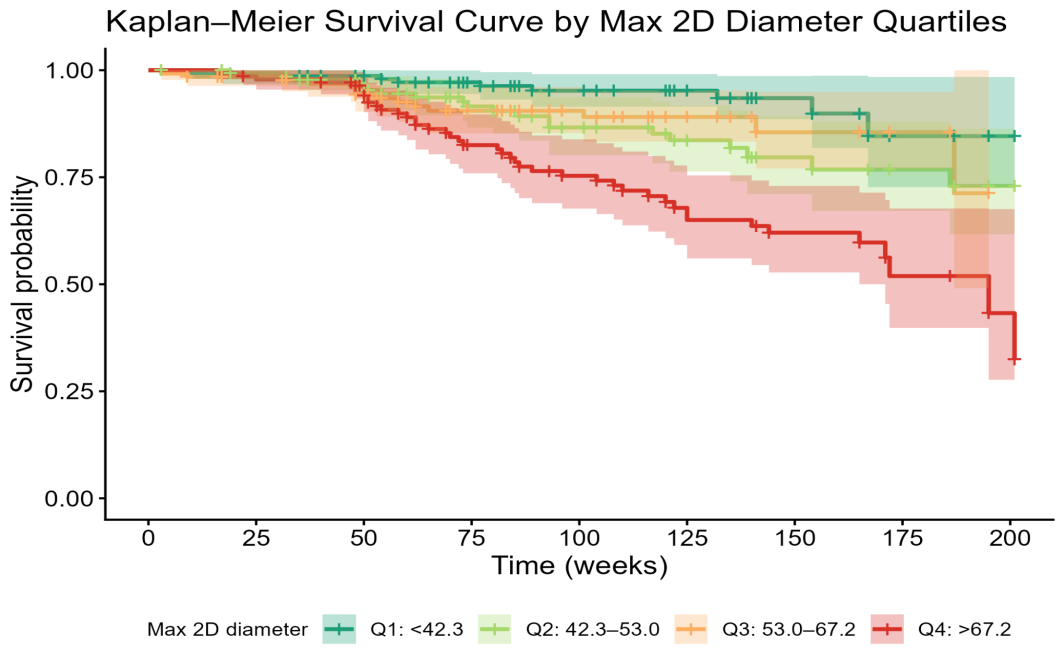





Bootstrap .632+ prediction error curve
Brier(t)
0.15
0.10
0.05
0.00
0
50
100
150
200
Time (weeks)


Calibration plot for 1-year overall survival
Observed 1-year survival probability
0.95
0.90
0.85
0.90
0.95
1.00
Predicted 1-year survival probability





Impact

Converted a descriptive imaging dataset into an actionable prognostic model enabling patient risk stratification and generation of interpretable imaging biomarkers suitable for downstream validation.

How This Helps Clients

For MRI or omics datasets with clinical follow-up, I provide survival-ready datasets, prognostic biomarker discovery, interpretable risk models, and publication-ready figures.