

The Cancer And Phenomics Toolkit (CAPTk)

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What is it?

A Software Suite for Computational Oncology and Radiomics encompassing core algorithms from the Center for Biomedical Image Computing and Analytics (CBICA):

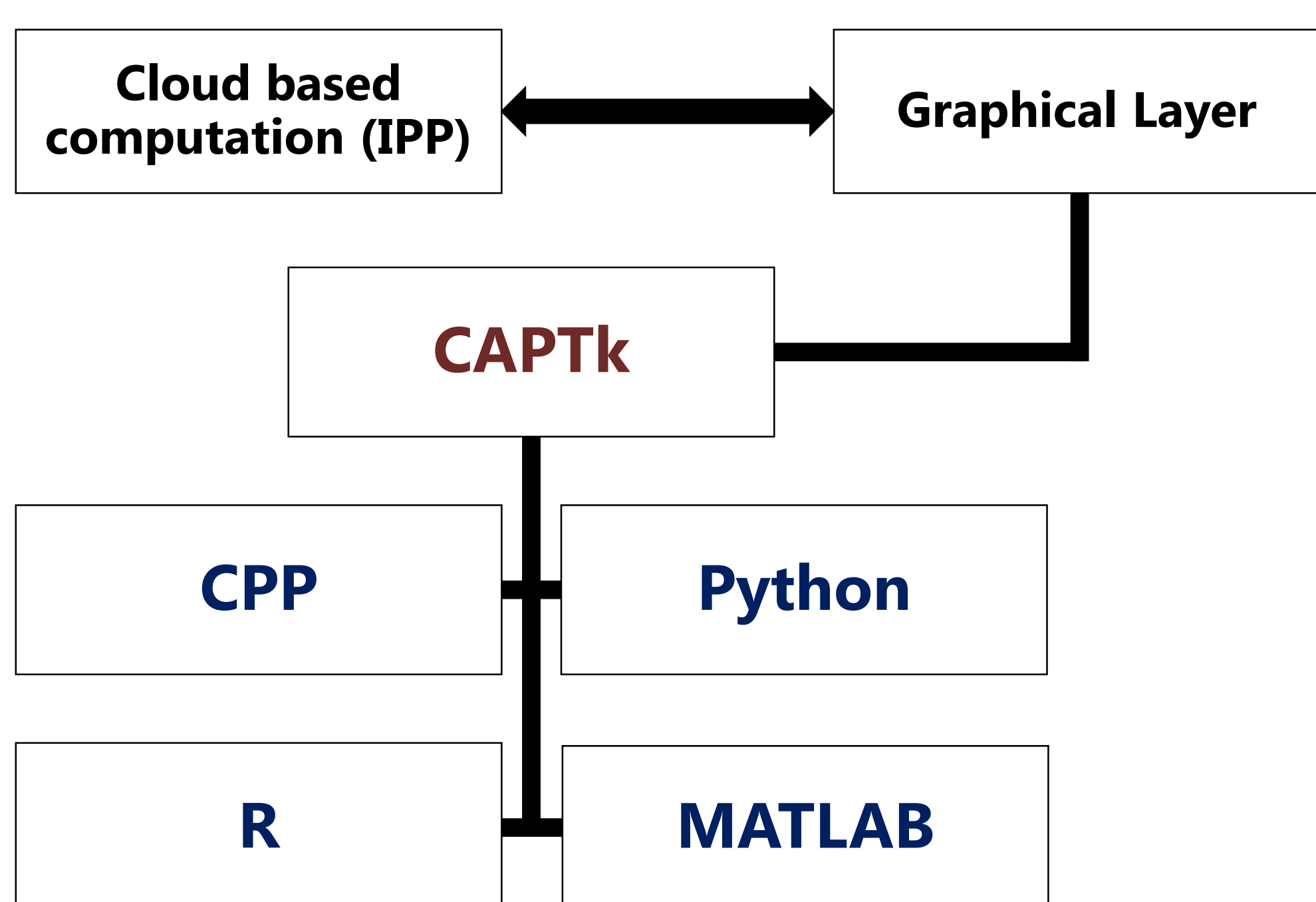
www.cbica.upenn.edu

Currently, the CAPTk is in development and its capabilities will change as the package matures over time and is closer to a stable release.

Goals

- ✓ Enable the larger scientific community (radiologists, clinicians, neuro-scientists and other researchers who don't deal with command line interfaces) to use cutting edge algorithms from computational research centers for clinically relevant studies through a user-friendly, platform-independent interface.
- ✓ Platform for researchers from computational centers to incorporate their algorithm in a form which can be used to target the larger scientific community as quickly as possible.

Overview of the Software Architecture



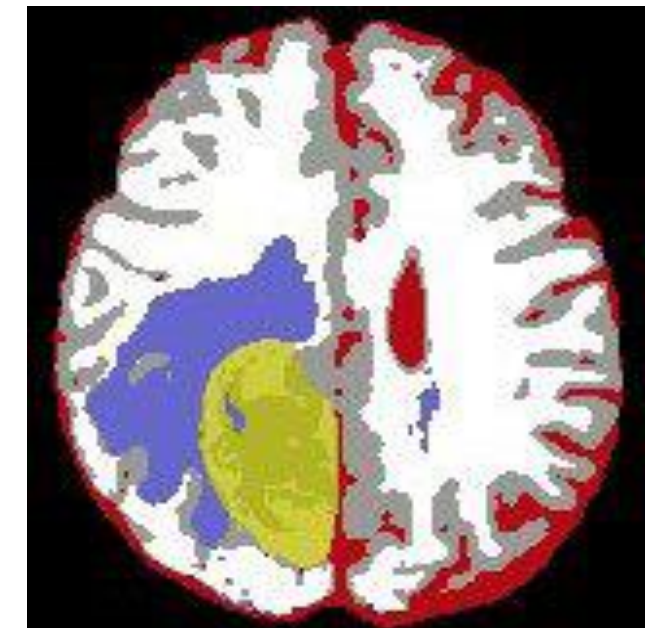
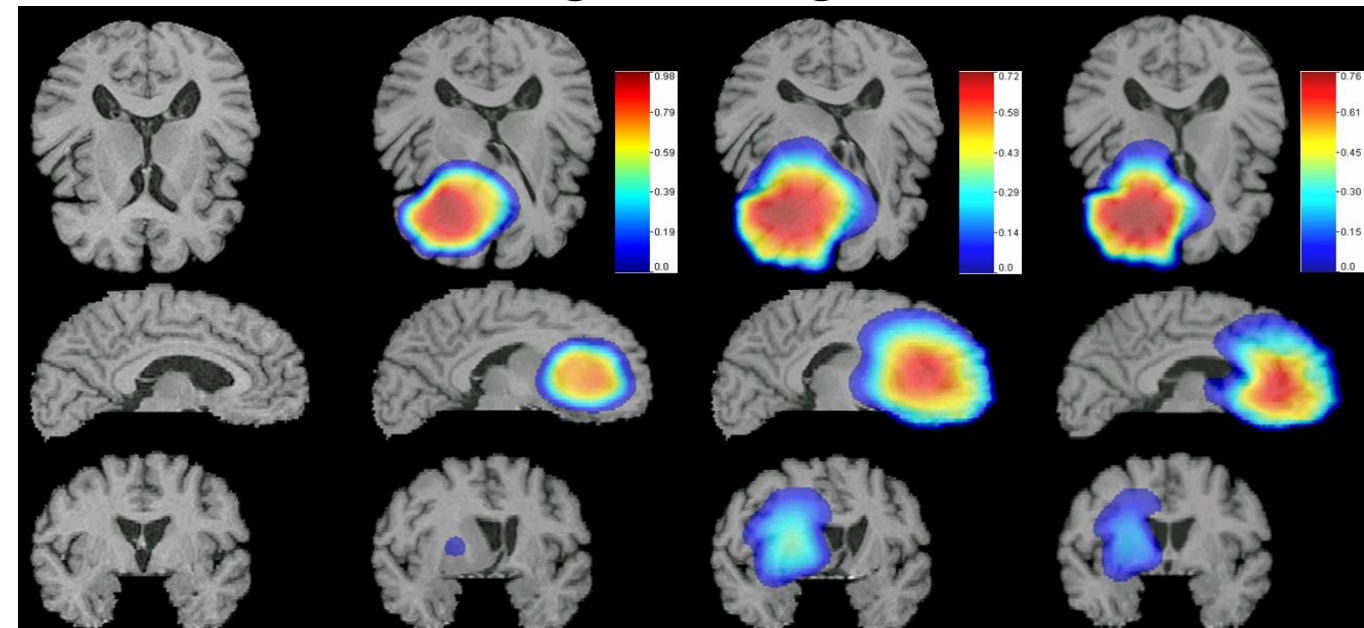
- Maximum flexibility for the interface ensured by decoupling interactions (initializations, ROI masks, etc.) from the scientific algorithms
- Data interchange format is based on open standards (standard text and NIfTI) for interfacing between 3rd party software packages
- Passing data to and from algorithms is open and API is well-documented
- Multiple languages supported for flexibility
- In future releases, graphical layer can talk to remote servers, Docker containers, etc. for heavy-duty computation tasks

Theoretical background

Computational Neuro-Oncology

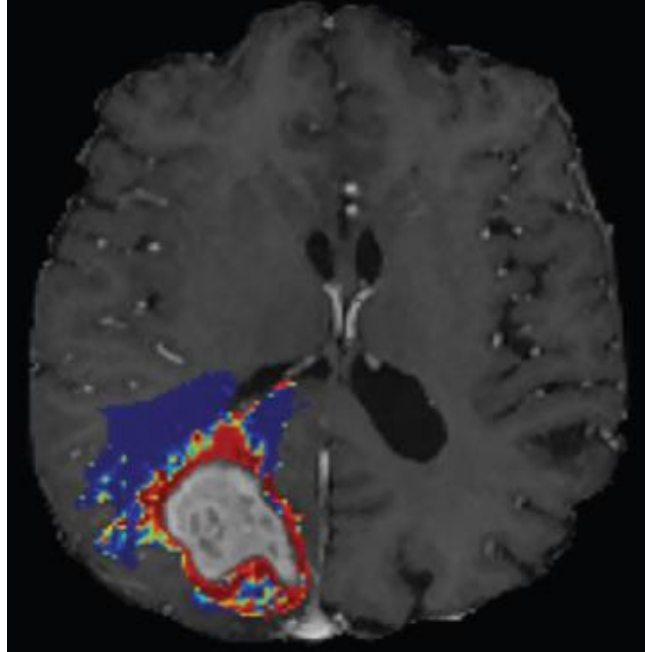
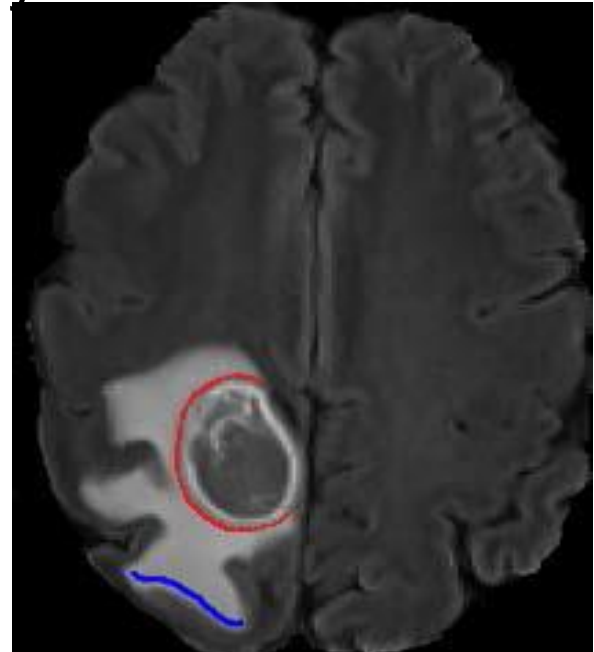
Modeling tumor growth

Segmentation



Molecular target identification via peritumoral heterogeneity assessment

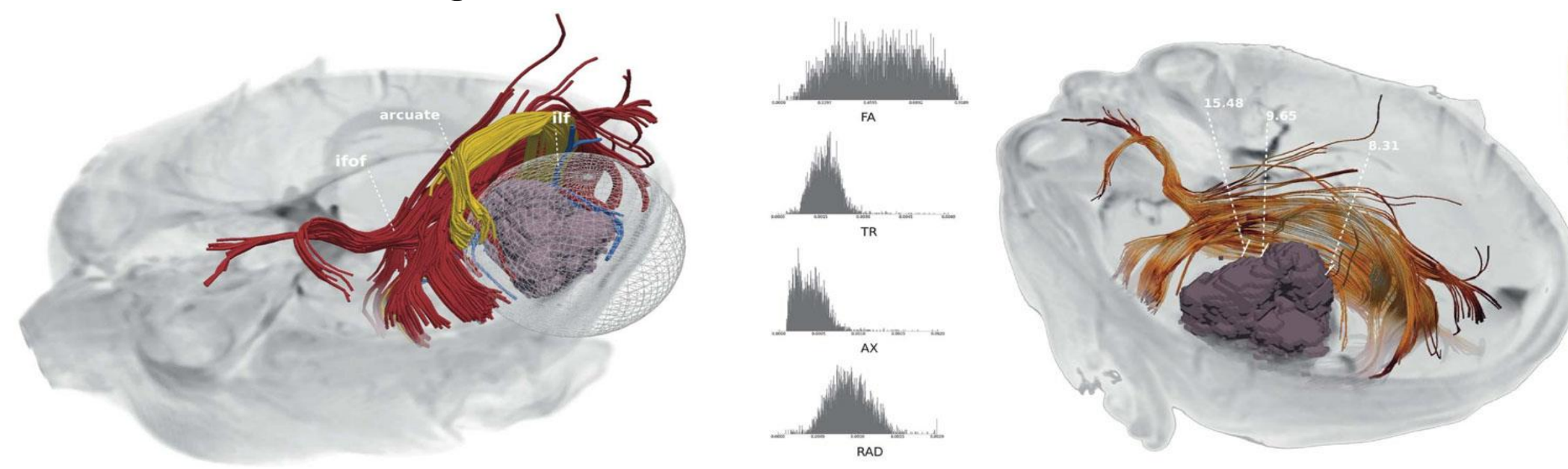
Predicting Recurrence



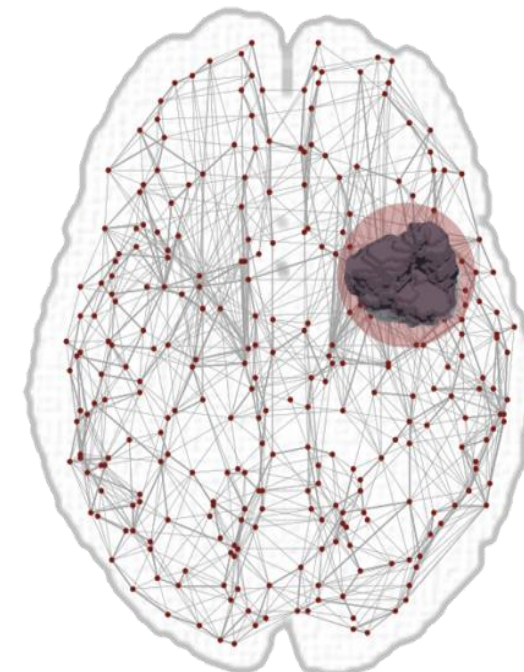
Computational study of Brain Connectivity

DTI-based Resection Margin Estimation

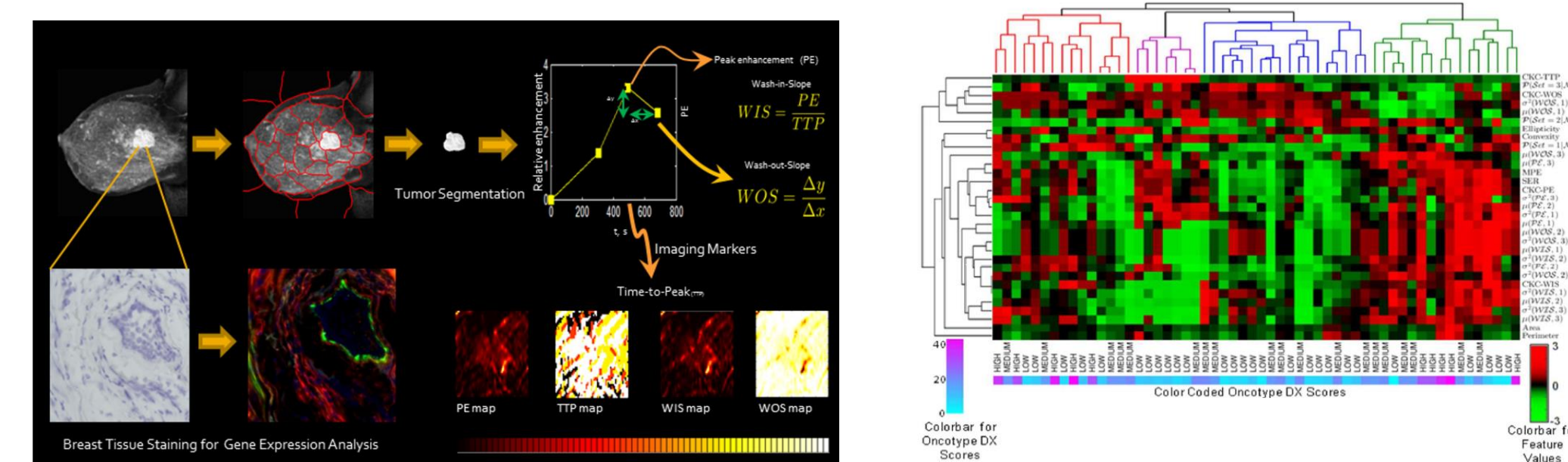
Perilesional Effects of GBMs



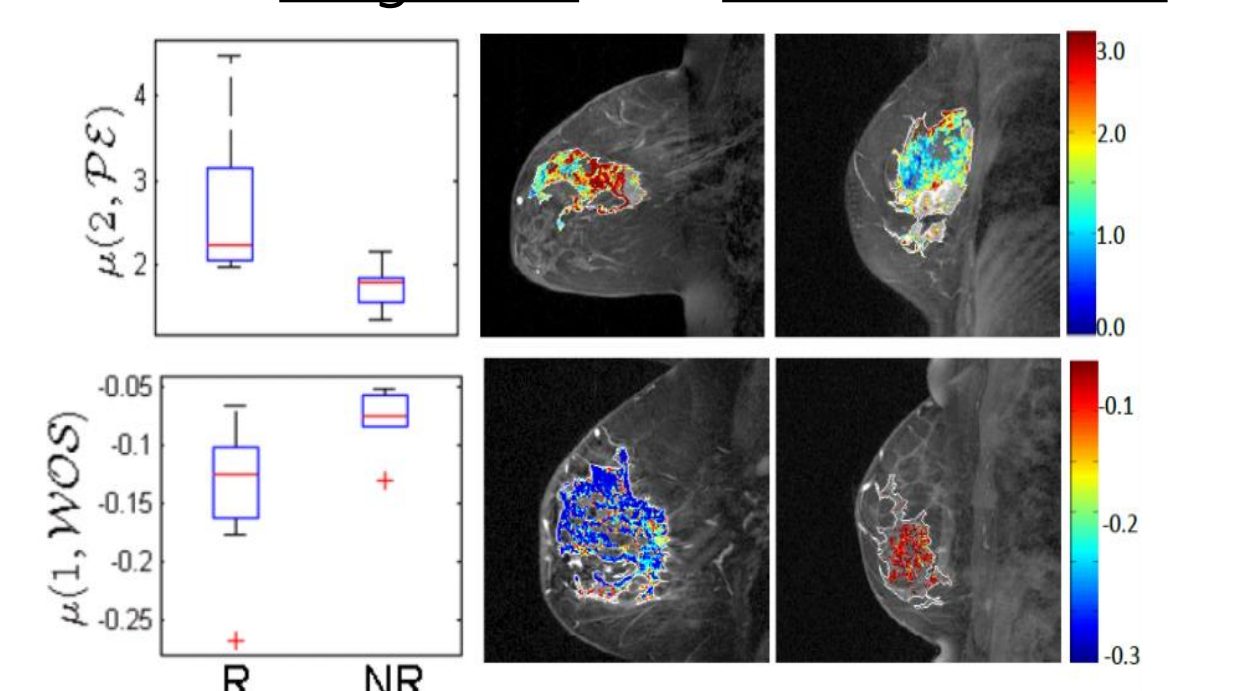
Global Effects of GBMs



Radiomic Breast Cancer Phenotypes

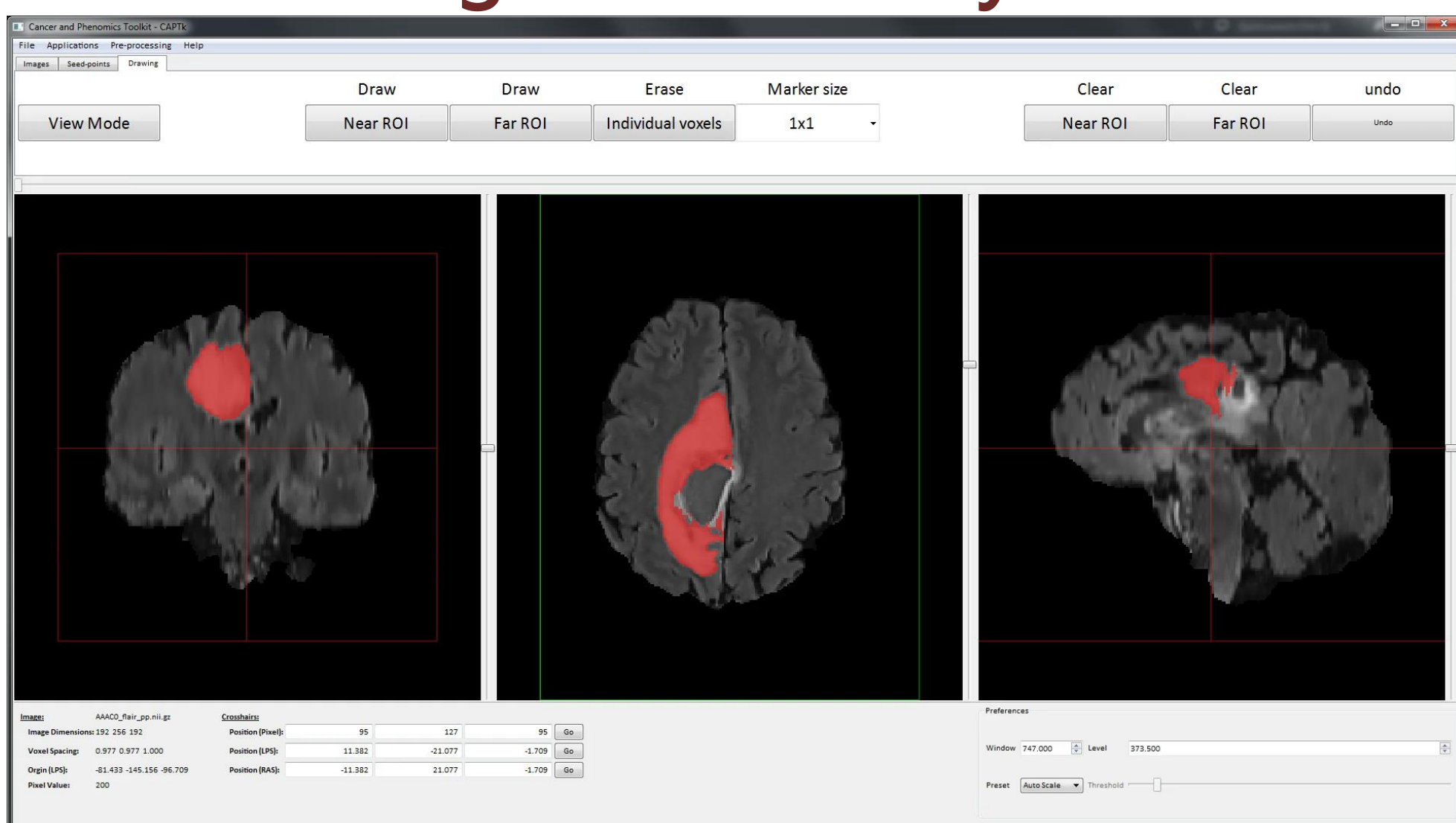


Intrinsic Imaging Phenotypes for Breast Cancer Prognostic and Predictive Value

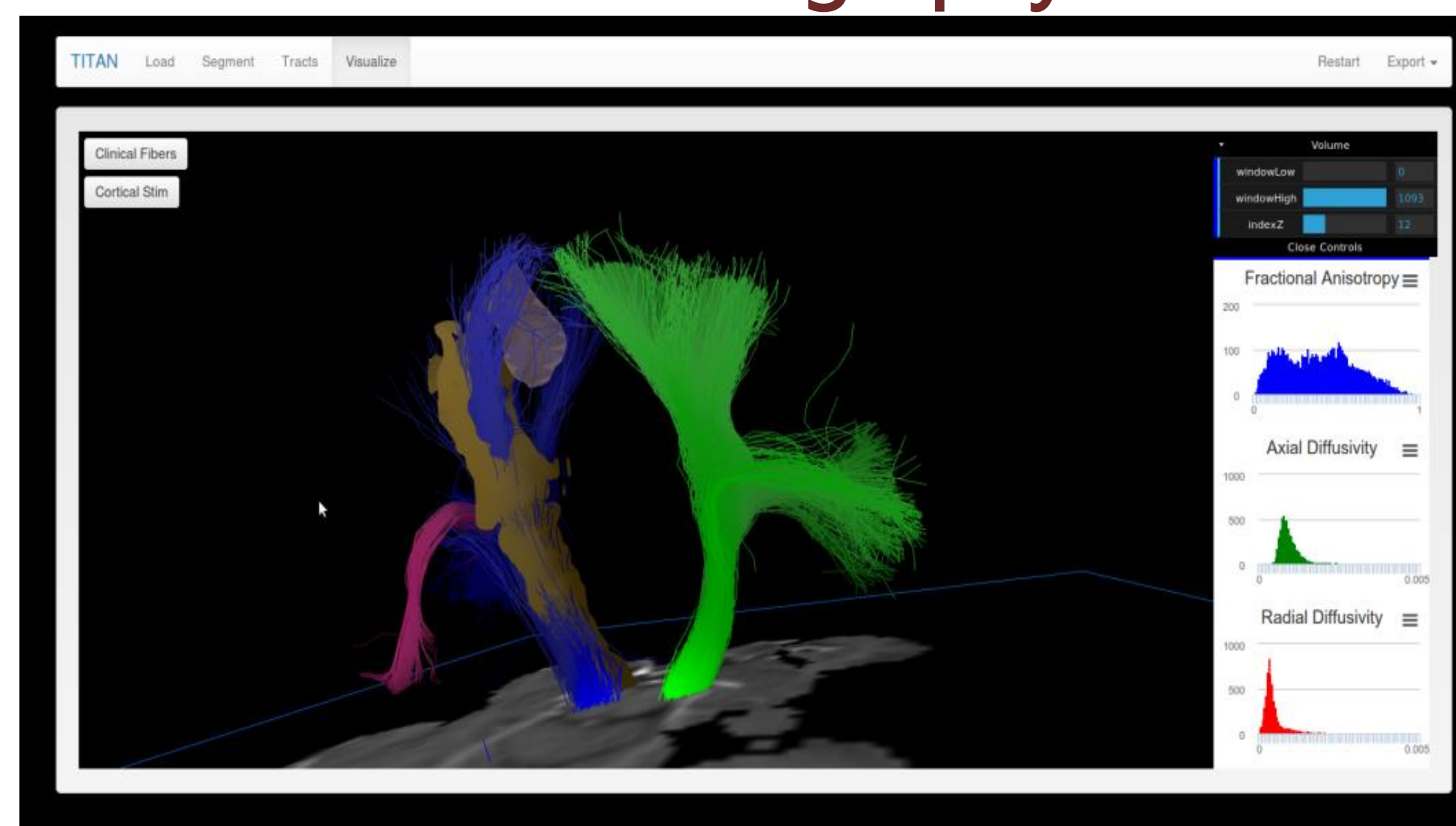


Exemplary Results from a few algorithms

Geodesic segmentation by Gaonakar et al.



TITAN - Tractography Tool



LIBRA results from Keller et al.

