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
  - Predicting recurrence
- Computational study of Brain Connectivity
  - DTI-based Resection Margin Estimation
  - Perilesional Effects of GBMs
- Radiomic Breast Cancer Phenotypes
  - Intrinsic Imaging Phenotypes for Breast Cancer Prognostic and Predictive Value
- Geodesic segmentation by Gaonakar et al.
- TITAN - Tractography Tool
- LIBRA results from Keller et al.

Exemplary Results from a few algorithms