Camino: An Open-Source Diffusion MRI Reconstruction and Processing

 Overview
Camino is an open-source, object-oriented software package for synthesising, reconstructing and processing diffusion MRI data. Camino implements a data processing pipeline, which allows for easy scripting and integration with other software. Camino is written in Java and is documented via Unix man pages. Programs are executed via wrapper shell scripts. The range of standard and cutting-edge processing diffusion MRI data. Camino implements a data processing pipeline, which allows for easy analysis of header data. Camino creates Analyze 7.5 headers for poring Camino data to other software.

Monte-Carlo Simulation
- Randomly-packed cylinders with gamma distributed radii
- Abutting, deforming cylinders simulating swelling
- Crossing cylinder substrates
- Arbitrary geometries using triangle meshes

The Camino Pipeline

Data Synthesiser

Data
- Input from the scanner or from the data synthesizer (datasynth).
- Syntheses data by emulating the scanner sequence.
  - Twice refocused spin-echo
  - Statistical measures extracted directed from particle dynamics
  - Generation of particle trajectories with separate scan data generation, allowing more than one data set to be generated per simulation.
- Use a range of pre-programmed Gaussian test functions (including a two and three compartment model), or specify your own.
- Simulates bootstrap experiments.
- analyzes headers creates Analyze 7.5 headers for porting Camino data to other software.

Pre-processing

Monte Carlo Simulation

Monte Carlo Simulation

Analytic Models

Analytic Models
- DTI
- Multi-tensor
- Hierarchies of two-compartment models

Features

Features
- mbalign performs model-based DWI alignment [10]
- trd computes trace of diffusion tensors.
- fa computes fractional anisotropy from tensors.
- dteig computes full tensor eigensystem.
- sfpk finds principal directions from non-tensor data.

Statistics

Statistics
- Mean and variance of scalar data.
- Mean orientation and concentration of principal directions.
- Statistics on success of multiple-fibre reconstruction routines.
- HARDI shape statistics
- HARDI peak finding

References