



Medical Image Analysis for Neuroimaging at the NIRAL

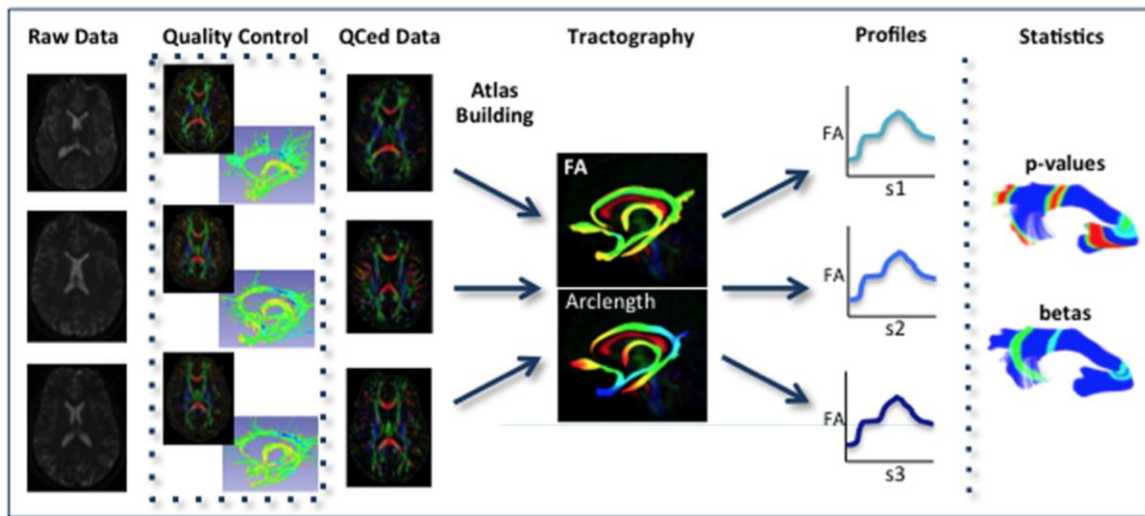
Department of Computer Science

University of North Carolina at Chapel Hill

March 2014

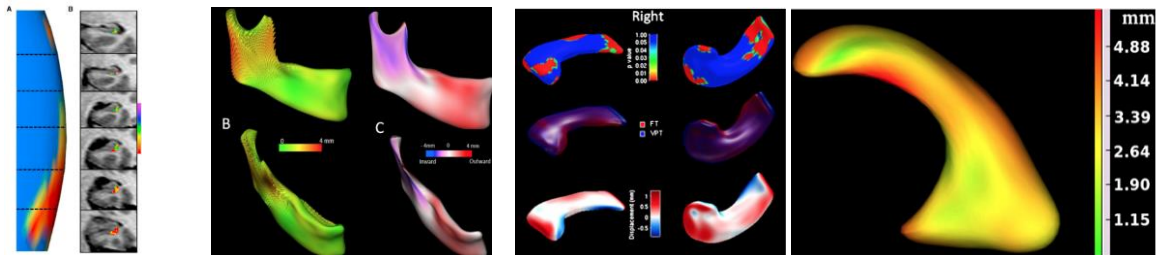
Atlas Based DTI Fiber Analysis Framework

Diffusion tensor imaging is an important modality in the field of neuroimaging to capture changes in brain micro-organization and to assess brain connectivity. We are conducting research to create a comprehensive, coherent, open source, end-to-end toolset for atlas fiber tract based DTI analysis (called the UNC-Utah NA-MIC DTI framework). There are ongoing research project as part of this effort, such as longitudinal atlas building, brain fiber tractography, and statistical analysis of diffusion properties. The framework has been used within our lab and by collaborators to make significant discoveries such as novel insights into brain development related to autism, leukodystrophies and prenatal drug exposure.



Shape Analysis of Anatomical Structures

Our shape analysis efforts are centered around three technologies: our well-known SPHARM-PDM framework (the de-facto standard in the field), a group-wise analysis framework employing particle based entropy optimization, and finally medial/skeletal shape descriptions. All of these are being integrated into a comprehensive, coherent, open source, end-to-end toolset to allow researcher to select the best method for the problem at hand. The major ongoing research focuses on extending the particle based and skeletal based parts of our shape analysis, including correspondence, statistical analysis and visualization. The framework has been used within our lab and in other labs around the world to make significant discoveries into many brain pathologies, among them autism, schizophrenia, drug abuse, or Alzheimer's disease.



Participating Departments: Computer Science, Psychiatry
Leaders: Martin Styner, Beatriz Paniagu