**Diffusion Tensor Imaging: In & Around the AFNI Package**

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http://afni.nimh.nih.gov

### Basic Processing Stream
- Conversion of images to AFNI or NIfTI-1 format
- Image alignment with program `3dAllineate`  
  - e.g., Mutual Information; affine or weakly nonlinear warping
- **Option:** nonlinear anisotropic smoothing with `3danisosmooth`  
  - All DW images in same collection smoothed the same way
  - 2D or 3D smoothing based on “local structure” of images
- Computation of DT, FA, etc, with program `3dDWItoDT`  
  - **D** tensor guaranteed to be positive definite
  - Two nonlinear optimization methods used to find best fit
  - **Option:** Outlier down-weighting followed by re-fit
  - Output results in NIfTI-1 format for input to other software  
    - e.g., Stanford program DTI-Query for fiber tracing:
  - Parts of AFNI's software are used in CATNAP DTI pipeline:  
    - http://iacl.ece.jhu.edu/~bennett/catnap/catnap.shtml

### UCSD Plugin for AFNI (Larry Frank et al)
- Detailed examination of DTI datasets for quality
- Fiber tracking via anisotropic diffusion simulation
- Can use HARDI (High Angular Resolution Diffusion Imaging) data

http://csci.ucsd.edu/projects/fiber-tractography.html

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**Needed:** DWI & DTI data interchange format!