Data interoperability of DTI-TK for DTI analysis

&

A preview of ITK-SNAP 2.0

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Data interoperability of DTI-TK for DTI analysis
A typical DTI analysis pipeline for a single subject
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1. Diffusion-Weighed Images
2. Diffusion-Tensor Images
3. Fiber Tractography
4. White Matter (WM) Tracts
5. Feature Computation
6. Measures of WM Tracts
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A typical DTI analysis pipeline for group studies

Population studies ← Spatial Normalization
How do existing DTI tools support DTI analysis?


Each subject
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Each subject:

- Diffusion-Weighted Images
- Tensor reconstruction
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- Spatial Normalization

Camino: Largest collection of tensor reconstruction algorithms & HARDI
How do existing DTI tools support DTI analysis?

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  - Probabilistic tractography & Tract-based spatial statistics (TBSS)
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- **Spatial Normalization**

**Tools**

- **Camino**
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  - Probabilistic tractography & Tract-based spatial statistics (TBSS)
- **DTIStudio**
  - Interactive deterministic tractography & Tract-specific ROI analysis
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- **DTI-TK**
  - DTI spatial normalization + atlas construction & Tract-specific analysis
DTI ToolKit: A Spatial Normalization and Atlas Construction Toolkit

Optimized for Examining White Matter Morphometry Using DTI Data.

Control Population

Subject 1

Subject 2

Subject 3

Subject 4

Disease Population

Subject 1

Subject 2

Subject 3

Subject 4

More discriminating image features 

1

Better Registration

Atlas

Closest to the average of the populations in shape and features

2

Spatial normalization and atlas construction

White matter morphometry

More discriminating image features

1

Better Registration

Atlas

Closest to the average of the populations in shape and features

2

Tensor-based registration leverages rich discriminating features afforded by DTI

1

Population-specific white matter atlas with shape-averaging

2

T1

DTI

For download, visit http://www.nitrc.org/projects/dtitk

Sunday, June 21, 2009
DTI-TK Quick Look Plugin for Mac OSX

About DTI-TK Quick Look Plugin
This plugin uses the Mac OS X Leopard’s built-in innovative Quick Look framework to enable a quick assessment of any 3-dimensional image volume in the supported medical image formats (NIfTI / Analyze / FreeSurfer) directly from the Finder. Using the Finder’s Cover Flow mode, a large collection of medical images can be browsed through and quickly inspected just as easy as flipping through your photos. Furthermore, a large number of images can be compared side-by-side by selecting them together in the Finder, then pressing the space bar to bring up the Quick Look preview mode.

System Requirements
Mac OS X 10.5 or later

Download Details

<table>
<thead>
<tr>
<th>Company</th>
<th>university of pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
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<tr>
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DTI-TK Quick Look Plugin: Cover Flow Mode
DTI-TK Quick Look Plugin: Multi-Volume Preview
Data interoperability of diffusion tensor images

\[ D = \begin{pmatrix} D_{xx} & D_{yx} & D_{zx} \\ D_{yx} & D_{yy} & D_{zy} \\ D_{zx} & D_{zy} & D_{zz} \end{pmatrix} = \lambda_1 e_1 e_1^T + \lambda_2 e_2 e_2^T + \lambda_3 e_3 e_3^T \]
Data interoperability of diffusion tensor images

\[
\mathbf{D} = \begin{pmatrix}
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matrix representation
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- matrix representation
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\text{DTI-TK} \quad \text{(} D_{xx}, D_{yx}, D_{yy}, D_{zx}, D_{zy}, D_{zz} \text{)}

lower triangular

This is the NIfTI Tensor standard

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\[ \text{DTI-TK} \quad (D_{xx}, D_{yx}, D_{yy}, D_{zx}, D_{zy}, D_{zz}) \]

\[ \text{Camino} \quad D_{xx}, D_{yy}, D_{zz}, D_{yx}, D_{zx}, D_{zy} \]

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individual NIfTI scalar files
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\[ \text{FSL} \]
\[ \lambda_1, \lambda_2, \lambda_3, e_1, e_2, e_3 \]
individual NIfTI scalar or vector files

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or
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**DTIStudio**

\[ D_{xx}, D_{yy}, D_{zz}, D_{yx}, D_{zx}, D_{zy} \]

individual Analyze files for export

\[ \text{or} \quad \text{FA}, e_1 \]

individual raw binary files for import

---
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  • New techniques can be more easily compared to existing tools
A preview of ITK-SNAP 2.0
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  • Enhanced support for manual segmentation via the new adaptive brush
  
  • User experience enhancement, including redesigned user interface, native file chooser, and automatic check for update
ITK-SNAP 2.0 Preview Demo

For download, visit http://www.itksnap.org
Acknowledgement

• DTI-TK
  • NIH grant: R03 EB009321
  • DTI-TK user community

• ITK-SNAP
  • NIH grant: R03 EB008200
  • Prof. Guido Gerig, original SNAP developers at UNC
  • ITK-SNAP user community

Thank you for your attention.