FA concentration analysis in optic fibers in autism

Based on Kim’s data and Nagesh’s DTI processing

Analysis done by PhD student Soo Hyun Park, SNU
Tractography Results

Control subject #001
Tractography Results

Autism subject #122
End Point Identification
FA analysis along fiber tracts

Average tensor measures of voxels within this range
subject 001
Group comparison
### Group comparison

<table>
<thead>
<tr>
<th>Tensor measures</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractional anisotropy (FA)</td>
<td>.5908</td>
</tr>
<tr>
<td>Frobenius norm (ND)</td>
<td>.6578</td>
</tr>
<tr>
<td>Radial diffusivity (Dr)</td>
<td>.5709</td>
</tr>
<tr>
<td>Axial diffusivity (Da)</td>
<td>.7235</td>
</tr>
</tbody>
</table>

#### ND

![ND graphs](image1)

#### Dr

![Dr graphs](image2)

#### Da

![Da graphs](image3)

#### Relative distance

![Relative distance graphs](image4)
What’s wrong with the analysis? Many things

• No treatment of noise in both geometry and measurements --- Use heat kernel smoothing on manifolds. Need to smooth tracts as well as FA values (IEEE TMI 2007).

• No tract-to-tract registration --- Use cosine series representation (Statistics and its interface 2010)

• Statistical analysis can be done without ROI and smoothly. Just parameterize smoothly using cosine series representation.