Stability metrics for optic radiation tractography: towards damage prediction after resective surgery

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Optic radiation reconstruction using tractography

- An accurate delineation of the **optic radiation** (OR) reduces the risk of a visual field deficit after epilepsy surgery

- The Meyer’s Loop (ML) to Temporal Pole (TP) distance is essential for predicting damage to the OR
Robust distance measurements by removing spurious fibers

- Problem: tractography prone to generate anatomically unlikely spurious fibers
- Stability metrics are introduced for the standardized removal of spurious fibers
Stability metrics – step 1

- Fiber-to-bundle coherence (FBC) measures can identify spurious fibers by the alignment with the surrounding fiber bundle.

- Fiber density estimation is performed in the lifted space of positions and orientations $\mathbb{R}^3 \times S^2$.
Stability metrics – step 2

• Find balance between removing spurious fibers and the extent of the Meyer’s loop.

• Standardized parameter selection through the measurement of the variability in ML-TP by repeated fiber tracking

• Evaluated for health volunteers (N=8)
Pre- and post-operative comparisons of the optic radiation

- Stability metrics applied for epilepsy patients (N=3) to predict OR damage
- Difference between predicted and observed damage estimated at 3.8 mm