Tumor invasion margin on the Riemannian space of brain fibers*

Gliomas are one of the most challenging tumors to treat or control locally. One of the main challenges is determining which areas of the apparently normal brain contain glioma cells, as gliomas are known to infiltrate for several centimeters beyond the clinically apparent lesion visualized on standard CT or MRI. To ensure that radiation treatment encompasses the whole tumour, including the cancerous cells not revealed by MRI, doctors treat a volume of brain extending 2cm out from the margin of the visible tumour. This expanded volume often includes healthy, non-cancerous brain tissue.

Knowing that glioma cells preferentially spread along nerve fibers, we propose the use of a geodesic distance on the Riemannian manifold of brain fibers to replace the Euclidean distance used in clinical practice and to correctly identify the tumor invasion margin. To compute the geodesic distance we use actual DTI data from patients with glioma and compare our predicted growth with follow-up MRI scans.

Results show improvement in predicting the invasion margin when using the geodesic distance as opposed to the 2cm conventional Euclidean distance.

* This research is in collaboration with
Parisa Mosayebi, Martin Jagersand (CS, UofA) Albert Murtha (Oncology, UofA)

Join us for refreshments in CAB 549 immediately following the Seminar

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