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Image created in the MATLAB
R2020b

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*Images of Research Competition
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Deforming Myelin Highways

Semi-finalist (2021)

Brain tissue is comprised of grey matter (neuronal cell bodies) and white matter (myelinated axons). Glioma, a highly diffusive and fast spreading brain cancer, preferentially moves along white matter tracts like “myelin highways”. This leads to finger-like projections of glioma cells throughout the brain that cannot be captured by medical imaging, hindering treatment efforts.

In order to better understand glioma invasion, my research uses mathematical models to examine how glioma spread is affected by white matter tracts and how brain tissue is altered by a growing, spreading glioma. My work also explores how these tissue changes feed back to alter patterns of further glioma invasion.

This image represents the impacts of glioma on a simplified version of a brain, with space and time on the vertical and horizontal axes, respectively. Lighter colors indicate regions of higher diffusivity, corresponding to the presence of white matter. As time progresses (from left to right), the glioma (not shown) pushes surrounding brain tissue, moving and deforming the white matter. After a long week of running simulations on a rather morbid topic, this beautiful figure was a pleasant surprise.