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USING PARSL IN CREATING MAPPERTRAC



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OUTLINE

- Acknowledgements
- Refresher on the science use case
- Evolution of MaPPeRTrac
- Progress since last year
- Future plans

ACKNOWLEDGEMENTS



Joseph Moon



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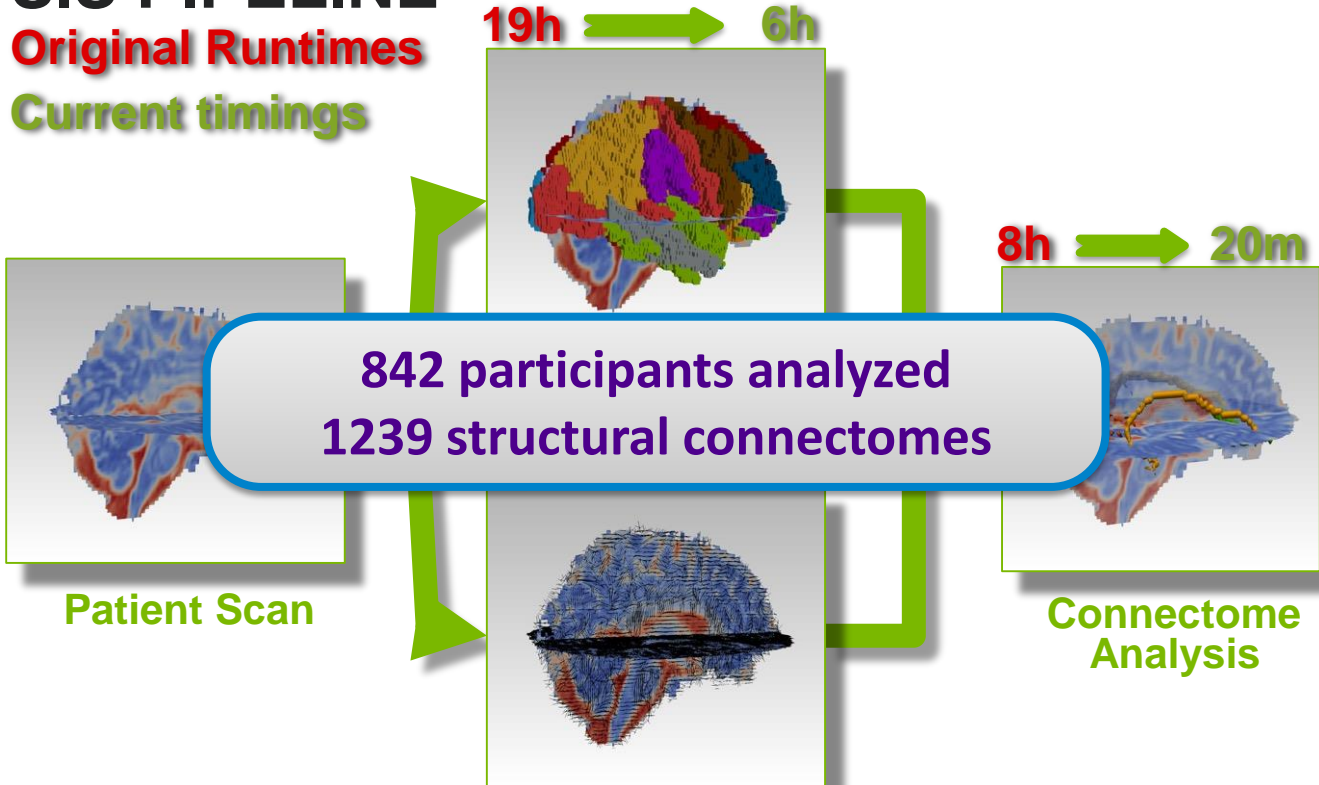
WHY DO WE NEED CONNECTOMES

- Structural connectome is a powerful tool to characterize the network architecture of the human brain
 - Shows great potential for generating important new biomarkers for neurologic and psychiatric disorders like Traumatic Brain Injury
- Structural connectome is based on network-centric view of the brain has the potential to uncover how information is rapidly communicated and integrated across multiple brain areas
 - Uses graph analysis of networks constructed using white matter fiber tractography
 - Resulted in discovery of highly connected regions in brain called “rich-club” nodes
- Structural connectome using Edge density imaging (EDI) maps the number of network edges that pass through every white matter voxel
 - Focus on white matter pathways that constitute the edges of the network

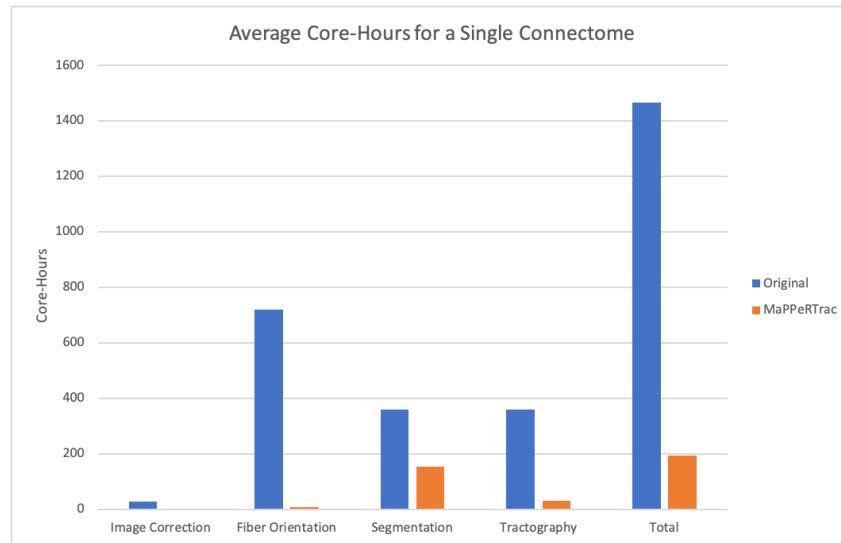
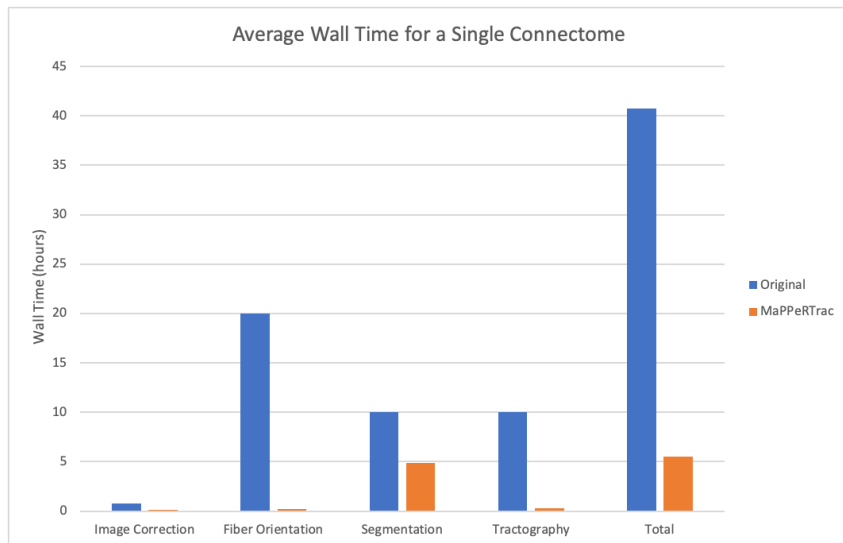
EVOLUTION OF THE PIPELINE

- Bash scripts
 - Hard-coded locations for applications and data
 - Worked well on one cluster at UCSF
- Python scripts
 - Parametrized
 - Ability to submit and run to SLURM
 - Worked well at LLNL
 - Application paths still hard-coded
- MaPPeRTrac
 - Uses Parsl
 - Successfully run at ANL, LLNL, AWS
 - Used Singularity container

MAPPERTRAC HAS DRASTICALLY SIMPLIFIED AND ACCELERATE THE CONNECTOME RELATED ANALYSIS PIPELINE



PERFORMANCE IMPROVEMENTS



MAPPERTRAC IS READY, ANALYSIS TOOLS ARE BEING REFINED AND VALIDATED

- The TRACK-TBI pipeline is ready to be deployed and to be generalized to other use cases
 - Fast and standardized analysis to support clinical research and application
 - ~1300 TRACK connectomes currently processed
 - Validation and verification is ongoing
- Available in open at <https://github.com/LLNL/MaPPeRTrac>
- New deep learning-based process is explored
 - CT anatomical segmentation and processing will enable improved multi-modal analysis of neuroimaging and clinical features.
 - Accelerated MRI anatomical segmentation will result in faster processing of connectomes.

WHAT'S NEXT FOR MAPPERTRAC

- MapperTrac
 - Complete testing on Google Cloud
 - Complete testing using docker container
 - Complete the manuscript
- Parsl issues
 - AWS issues
 - It would be nice to have a repository of configurations for known HPC and cloud infrastructures that can be installed as plug-ins

THANK YOU