

Brain Image Analysis Seminar

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From Connectome to Behaviorome, and the Computational Challenges Encountered Along the Way

December 7, 2018 3:00pm, Medical Science Center 4765

Abstract: In this talk I will first offer my own assessment, as both a computational researcher and a practicing physician, of the current landscape of connectomics (and more broadly neuroimaging in general) and where the field could go from here. Then, to further illustrate my point we will discuss the existing limitations of BOLD correlation based functional connectomics and how our team's research hopes to tackle it by leveraging fundamental principles of modern physics that were first discovered in statistical and thermal physics (e.g., the maximum entropy principle, Boltzmann distribution, etc.) Then, we will examine how other modern data mining methods can be applied (in particular, manifold learning) to connectome data. If time permits, we will conclude the presentation with a family of new deep-learning 'digital phenotyping' approaches that take neuroscience research from the lab into the wild and in real time, potentially disrupting traditional research paradigm and empowering patients along the way. Talk is in part based on paper <http://doi.org/10.1016/j.neuroimage.2018.10.073>.

Short Bio: Dr. Leow received clinical training in Psychiatry and research training in biomedical imaging, both at UCLA. Dr. Leow's current research interests focus on developing novel probabilistic reconstruction, tractography, and network analyses techniques for high angular resolution diffusion imaging (HARDI) and their clinical applications. Prior to joining the faculty of the Departments of Psychiatry and Bioengineering at UIC, Dr. Leow was affiliated with the Laboratory of NeuroImaging (LONI) at UCLA, and developed several key high-dimensional non-linear image registration techniques. Besides research, Dr. Leow enjoys playing classical piano as both an amateur soloist and a chamber musician.