Optimizing the quantity/quality trade-off in connectome inference

Abstract: We demonstrate a meaningful prospective power analysis for an (admittedly idealized) illustrative connectome inference task. Modeling neurons as vertices and synapses as edges in a simple random graph model, we optimize the trade-off between the number of (putative) edges identified and the accuracy of the edge identification procedure. We conclude that explicit analysis of the quantity/quality trade-off is imperative for optimal neuroscientific experimental design. In particular, identifying edges faster/more cheaply, but with more error, can yield superior inferential performance.

This is joint work with Joshua Vogelstein (JHU AMS) and Davi Bock (HHMI Janelia)