Seminar/Talk

Neuroscience Talk Vankat Ramaswamy

Venkat Ramaswamy
Birla Institute of Technology & Science

Host: Tim Vogels

TL; DR: Non-existence of tractable algorithms for neural circuit interrogation could pose a barrier to comprehensively understanding how neural circuits cause behavior.Neuroscience is witnessing extraordinary progress in experimental techniques, especially at the neural circuit level. These advances are largely aimed at enabling us to understand precisely how neural circuit computations mechanistically cause behavior. Establishing this type of causal understanding will require multiple perturbational (e.g optogenetic) experiments. It has been unclear exactly how many such experiments are needed and how this number scales with the size of the nervous system in question. Here, using techniques from Theoretical Computer Science, we prove that establishing the most extensive notions of understanding need exponentially-many experiments in the number of neurons, in many cases, unless a widely-posited hypothesis about computation is false (i.e. unless P = NP). Furthermore, using data and estimates, we demonstrate that the feasible experimental regime is typically one where the number of experiments performable scales sub-linearly in the number of neurons in the nervous system. This remarkable gulf between the worst-case and the feasible suggests an algorithmic barrier to such an understanding. Determining which notions of understanding are algorithmically tractable to establish in what contexts, thus, becomes an important new direction for investigation.Preprint: https://biorxiv.org/content/10.1101/639724v1/Tweeprint: https://twitter.com/VenkRamaswamy/status/1132969215646871552

Friday, October 2, 2020 03:00pm - 04:00pm
Online Talk crowdcast

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