

Project MindScope: From Big Data to Behavior in the Functioning Cortex

Mike Hawrylycz, Allen Institute for Brain Science

As the most complex piece of matter in the known universe, the brain gives rise to behavior, mind, and consciousness. With roughly 86 billion neurons, each coupled to as many as 10,000 others, unraveling the brain's function and what causes us to make decisions is a daunting task. The Allen Institute for Brain Science is pursuing an ambitious project, called *Project MindScope*, to further our understanding of the brain using a tripartite approach based on Components, Computation, and Cognition. From the Components viewpoint, we aim to identify the characteristics of single neurons, from physiology to morphology and genetic profile, as well as the connectivity that defines regions and local circuits. In Computation the goal is to understand the properties of neural response, i.e. the "neural code", in sensory areas such as during behavior. Finally, in Cognition the aim is to put all of the pieces together in order to understand aspects of causal behavior, specifically the task of object recognition and the role of attention.