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Essay: From Single Cells to Neural Circuits

The human brain is composed of billions of neurons, wired together into neural circuits by trillions of synapses. Deciphering the organization of these neural circuits is a fundamental goal of neuroscience. Historically, however, studying neural circuits has been a time-consuming and labor-intensive endeavor. Michael Skinnider developed a pair of machine-learning tools, named Augur and Magellan, to accelerate the pace at which neural circuits can be mapped. These tools are designed to operate on data generated by the emerging techniques of single-cell and spatial transcriptomics, which can measure the expression of thousands of genes across tens of thousands of neurons in a single experiment. Applying Augur to single-cell and spatial transcriptomic data from the mouse spinal cord revealed a subpopulation of neurons that allowed paralyzed mice to recover the ability to walk again. Together, Augur and Magellan provide a framework that could accelerate our ability to identify the neurons underlying any given behavior.