

Abstract:

Brains are highly interconnected networks of millions to billions of neurons. For a century, we have not been able to map these connectivity networks at synaptic resolution. Only recently, using novel electron microscopy techniques and machine-learning based data analysis, the mapping of neuronal networks has become possible at a larger scale. This new field of connectomics is still limited by technology and requires efficient AI-based analysis of peta-to-exascale datasets, but it is already starting to provide exciting insights into how neuronal circuits operate in the brain. We are turning connectomics into a high-throughput screening technique for neuroscience, for discovering brain-implemented algorithms, which may inspire novel machine learning, to map the imprints of sensory experience onto neuronal networks in the brain, and to investigate connectome alterations in models of psychiatric disease.