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Artificial Intelligence in Cognitive Neural Engineering

The goal of cognitive neural engineering is to develop novel treatments for disorders of cognition through bi-directional neuronal interfaces.
In my presentation, I argue that an essential aspect of cognitive neural engineering is the development of algorithms for causal representation learning (CRL), i.e., algorithms that enable us to learn from data how large-scale neuronal activity gives rise to (disorders of) cognition. I introduce the framework of CRL, discuss some difficulties in designing computationally-efficient inference algorithms for CRL, and illustrate the implementation of CRL on whole-brain calcium imaging data from larval zebrafish. I conclude by highlighting a successful application of cognitive neural engineering in the context of stroke rehabilitation.