



BCL5

5th Workshop on Brain, Computation, and Learning



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Solving the ensemble problem in visual cortex using artificial networks

Abstract: How does the brain assemble visual perception from spikes emitted by individual neurons? For decades, studies of the primate inferotemporal (IT) cortex have focused on neurons that align with our semantic intuitions (those selective for faces, hands, or familiar objects). But this localist view, while fruitful, overlooks a broader story as the vast majority of IT neurons are not so easily interpretable --- yet they play a critical role in population-level representations. In this talk, we will trace the historical arc of IT research, from early lesion and recording studies to the emergence of the "grandmother cell" debate. We will then explore a more complete view of the ensemble code, revealing how artificial neural networks can help us characterize these complex populations. Through closed-loop image optimization, occlusion, and transplant experiments, we will see that most neurons respond to precise, local features rather than holistic object categories. Finally, we will see behavioral data from monkeys that helps bridge these neural representations with perception. Overall, this will illustrate how modern networks advance neuroscience, not only by modeling brain function, but by generating testable hypotheses and revealing structure in the neural code that human intuition alone might miss.