

Current Topics in Computational Neuroscience

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Fast and accurate spike sorting for thousands of channels

Understanding how assemblies of neurons encode information requires recording of large populations of cells in the brain. In recent years, multi-electrode arrays and large silicon probes have been developed to record simultaneously from thousands of electrodes packed with a high density. To tackle the fact that these new devices challenge the classical way to perform spike sorting, we developed a fast and accurate spike sorting algorithm, validated both with in vivo and in vitro ground truth experiments. The software, performing a smart clustering of the spike waveforms followed by a greedy template-matching reconstruction of the signal, is able to scale to up to 4225 channels in parallel, solving the problem of temporally overlapping spikes. It thus appears as a general semi-automated solution to sort, offline, spikes from large-scale extracellular recordings. In addition, a refined implementation can be used to perform online spike sorting, and therefore paves the way towards future closed-loop experiments involving recordings with hundreds of electrodes.