Introduction

- How could we tell if the neurons we recorded on day 1 stay the same across multiple days of experiments?

Spike-sorting algorithm

Objective: In order to improve the performance of BCI devices and to better answer neuroscience questions, we seek to quantitatively assess the stability of neurons recorded on subsequent days from the chronically implanted electrodes.

Processing workflow:

1. Principal components analysis (PCA) used for dimensionality reduction
   - Keep the same low-dimensional projection across days
   - First 5 components were used
2. K-means clustering for initializing cluster centroids
   - Equal covariance and prior probabilities were also used to initialize sorting
3. Fit parameters of a Mixture of Gaussians (MoG) model using Expectation Maximization (EM)
   - First 5 components were used
   - Keep the same low-dimensional projection across days
4. If prior model existed, classify data using log-likelihood with prior parameters
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Conclusions:

- This method can identify when new units appear or existing units disappear when testing
- However, it is not as robust for small shifts in waveform shape, which are common
- This requires an algorithm that can allow for these shifts

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