Neural Engineering: Lecture Notes

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Chapter 1

Spike Detection

Chapter 2

Spike Sorting

After the *spike detection* phase described in Chapter 1, the detected spikes must be **sorted**. In the *spike sorting* procedure, each detected spike is assigned to a particular source (*i.e.* to a particular neuron).

In general, while it is possible for a human experimenter to assign spikes to different neurons by a visual inspection of the waveform, the automatization of such a process in a signal processing environments requires two main steps:

- **Feature selection** in which some quantitative parameters (*i.e.* features) are extracted from each segmented spike
- **Clustering** or **classification** in which the different *feature vectors* are arranged into groups, each of which is representative of a particular neuron

While the first step is essentially limited to the calculation of an arbitrary number of synthetic indicators, the grouping phase requires a number of preliminary analyses that are needed to tune the parameters of the algorithms, the most trivial one being the definition of the number of clusters to be extracted.