The Lorry I. Lokey Interdisciplinary Center for Life Sciences and Engineering
NETWORK BIOLOGY RESEARCH LABORATORIES

Spike Sorting Techniques – Project Overview

Introduction

A common technique for recording neuronal data from a population of neurons involves the use of multi-electrode arrays (MEA). One drawback of this technique is that the signals acquired cannot be directly assigned to single cells.

However, many types of neuronal data analysis require the precise information of single neurons' spiking times. The process of extracting this information from MEA recordings is known as spike sorting. Spike sorting poses engineering challenges in the areas of signal processing, feature extraction and pattern classification.

Prerequisites

- 046326 - Introduction to Biological Signals and Systems
- 046195 – Machine Learning – preferable
- Programming experience in Matlab

Project Description

The goal of this project is to develop and implement different spike sorting methods. The students will begin by studying the basic properties of MEA recording and the challenges introduced by this technique. Next, they will study and implement methods of spike sorting introduced in the recent literature and test their performance using real neuronal data. Based on the experience acquired in the project, the students will then try to suggest a novel approach to spike sorting.

Project Requirements

- Acquiring an understanding of MEA recording and spike sorting
- Implementation of different spike sorting methods and evaluation of their performance
- Development of a novel spike sorting method, based on experience with existing ones

Project Duration

One semester, with an optional extension

Contact

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