Program Overview

Day 1: Monday, June 21, 2010
7:00 am – 6:00 pm  Registration Open
7:00 am – 9:00 am  Continental Breakfast
7:00 am – 9:00 am  DBS Consortium Meeting
9:00 am – Noon  Morning Sessions
11:30 am – Noon  Poster Blitz
Noon – 2:00 pm  Lunch on your own. Posters and Exhibits open
1:00 pm – 2:00 pm  Poster Session 1 (all presenters please be by your posters)
2:00 pm – 5:30 pm  Afternoon Session
3:30 pm – 4:00 pm  Afternoon Break in Posters, Exhibit Area
5:30 pm – 7:00 pm  Welcome Mixer in Posters, Exhibit Area

Day 2: Tuesday, June 22, 2010
7:00 am – 4:30 pm  Registration Open
7:00 am – 8:30 am  Continental Breakfast
7:30 am – 8:30 am  Breakout Sessions
8:30 am – Noon  Morning Session
10:00 am – 10:30 am  Morning Break in Posters, Exhibits Area
Noon – 12:30 pm  Poster Blitz
12:30 pm – 2:30 pm  Lunch on your own. Exhibits and Posters open
1:30 pm – 2:30 pm  Poster Session 2 (all presenters please be by your posters)
2:30 pm – 4:00 pm  Afternoon Session
4:00 pm – 5:00 pm  Special Session for Students
7:00 pm – 10:00 pm  Aquarium of the Pacific Event

Day 3: Wednesday, June 23, 2010
7:00 am – 1:00 pm  Registration Open
7:00 am – 8:30 am  Continental Breakfast
7:30 am – 8:30 am  Special Session: Future of NIC
8:30 am – 12:30 pm  Morning Session
10:00 am – 10:30 am  Morning Session
12:30 pm – 2:00 pm  Box Lunch Provided
12:30 pm – 2:00 pm  Breakout Sessions
2:00 pm  Posters and Exhibits Area Closes to Attendees
2:00 pm – 6:00 pm  Poster and Exhibit take down
2:00 pm – 5:30 pm  Afternoon Session
3:30 pm – 4:00 pm  Afternoon Break in 2nd Floor Lobby
5:30 pm  Meeting Adjourned – Thank you for your participation

Pre-conference workshop: Beyond Brain-Machine Interface  Room 201 A & B
Exhibitor Setup  Exhibit Hall B
Registration Open  Lobby

Waveform Stability and Neural Decoder Performance Across 7 Weeks

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Recent work in brain machine interfaces has demonstrated substantial improvements in performance compared to initial demonstrations. Currently, experiments are usually conducted by collecting training data every day, and using that data to build the neural decoder for that day. This assumes that there are changes in neural waveforms, and possible changes in neural tuning across days. However, these effects have not yet been fully quantified. Toward that end, one monkey was run on a standard center-out reaching task while neural data was recorded from a 96-channel “Utah” array for 39 out of 45 days. Between task sessions, wireless data was obtained from a subset of channels using HermesC, a wireless recording system for freely moving primates (Chestek et al, IEEE TNSRE, 2009). While 86% of the electrodes had a single unit on at least one day, substantial changes in waveforms were observed such that only 1 out of 96 electrodes had a stable single unit on all days. For the subset of neurons that could be tracked for some number of days, tuning curves were highly correlated, averaging R = 0.99. However, only a small number of units were visible more than half the time. Offline neural decodes were performed using a discrete classifier to compare performance across time. We found a small decrease in performance from using an (incorrect) spike-sorting model from a different day (-5.4%), or from using threshold crossings (-5.3%) rather than fully spike-sorted data. However, we found a dramatic decline in performance when the neural decoder was not retrained daily, reaching 50% of the initial performance value by days 3-8. With threshold crossings, the performance drop could be reduced to 26% (rather than 56%) by setting the threshold to match the average firing rate across days. Shifting the emphasis from fully spike-sorted data to threshold crossings, it may be possible to demonstrate high performance from cortical arrays for longer periods of time than previously supposed. In fact, high-speed prosthetics experiments have been performed using threshold crossings on this same array 2.25 years after implantation, with better speed and accuracy than previous studies (Gilja et al, this conference).

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