Field Recordings, Mind, and the Eternal Hum or Whisper

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1 Introduction

Our ability to build effective, useful brain-computer interface (BCI) is limited by the capabilities of our scanning devices and by our inchoate knowledge of neural activity, especially outside of lab settings. While we expect mobile brain scanners to improve dramatically over the next few years (the Melon headband, Interaxon Muse and Emotiv Insight all promise much better scanning resolution, comfort and battery life than current-generation devices), our ability to understand brains "in the wild" is limited primarily by a paucity of relevant data. Almost all neurological studies, BCI research included, occurs under controlled conditions rather than in the normal human habitat, a perceptually rich environment in which people are moving freely and interacting space, objects and people.

Presently, there exists no large-scale repository for "field recordings" (i.e., long-timescale recordings taken in uncontrolled, non-lab environments) of neural signals, making it difficult for researchers to draw the sorts of observations that might improve BCIs, and our understanding of mind generally.

The difficulty of dealing with nonstationarity nature in neural signals provides a salient example of our knowledge gap: a BCI that works with one person will most likely not work with another, and may even stop working on the original subject over time, due simply to the fact that minds shift and change and grow. It is tempting to believe that such changes and differences, especially those observed within subjects over time, can to some extent be predicted statistically given enough data. However, without a large-scale source of neural field recordings, it is difficult or impossible for researchers to make the sorts of observations necessary to divine these patterns.

This paper explores what a platform for neural field recordings might look like, approaching the problem from an information architecture standpoint and from a user interface one. How do we scale a data collection platform to hundreds of thousands of users, all of whom are producing megabytes of data every minute? How do we incentivize users to donate their neural data, and how do we assure their privacy? How might we manage access and ownership in a publically available research repository while maintaining the confidentiality of individuals involved?

maybe we talk about what this paper covers here, in summary, when we figure that out

2 Background & Related Work

- everyman's intro to bci, w ML esp
- BCI in the wild (still so bad)
- data repositories for science