

Exploiting big data to improve canonical response functions for psychophysiological modelling

2020-05/Area: biopsychology/human neuroscience/bioengineering

Background

Cognitive and emotional states in human research are often inferred from autonomic nervous system signals recorded at the body surface ¹. A strategy that is increasingly being used is to invert psychophysiological forward models that describe the mapping from cognitive process to data time course. This is often based on canonical response functions, which should be derived from large data sets ² but in reality are more often based on small to medium-sized samples ³⁻¹⁰.

In this project, you will use existing data sets including pupillometry, ECG, respiration, skin conductance, and startle eye-blink responses. You will pre-process these data and fit them in order to improve the canonical response functions used by other researchers for data analysis by many labs in the field.

What you can learn

- Model-based analysis of biophysical signals with the Matlab-based software PsPM (bachlab.org/pspm)
- Bioengineering concepts
- Applied statistics skills
- Coding skills

Your profile

(1) You have a background in statistics, engineering, or physics, and a strong interest in biosystems.

(2) Your background is in neuroscience, psychology, biology, or related fields, and you have experience with applied statistics and bioengineering.

In either case, an ability to conduct data analyses (e.g. in Python, R, or MATLAB) is required.

Supervision

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Literature

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