Ruiqi Chen

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EDUCATION

Bachelor of Science | Peking University   2017.9 - Present
· Major: Intelligence Science and Technology (degree expected in 2021.7)
· Overall GPA: 3.59/4.0   Last term's GPA: 3.70/4.0
· English skills: GRE 338/340 (AW 4/6) , TOEFL 106/120 (Speaking 24/30)

RESEARCH EXPERIENCE

IDG/McGovern Institute for Brain Research | Tsinghua University   2019.7 - Present
· **Advisor:** Prof. Hong, Bo (PI)
· **Project (Leader): EEG Functional Connectivity Microstates (Link)**   2019.9 – Present
  − Discovered the hierarchical, self-similar structure of EEG functional connectivity microstates by analyzing the results with different sliding window length and different number of clusters
  − Illustrated the consistency between functional-connectivity-based and voltage-distribution-based EEG microstates by their similarity in spatial topology and temporal dynamics
  − Established the link between the proportion/stability/connectivity profile of a specific microstate and activity of the Default Mode Network (DMN) under different task conditions
  − Explored the interaction between alpha oscillation and microstate dynamics
· **Pilot Study on EEG Microstates (Link)**   2019.8
  − Recorded long-time EEG signal from 5 subjects while they were resting/listening to a story/listening to music, with eyes open or closed
  − Conducted k-means clustering based on voltage distribution or functional connectivity pattern
  − Analyzed results with mathematic tools including dynamic general linear model, multidimensional scaling, unsupervised learning, and silhouette evaluation (Codes)
· **EEG Oddball Experiment (Link)**   2019.7
  − Designed and performed an EEG oddball experiment with Psychtoolbox
  − Conducted event-related potential (ERP) analysis with EEGLAB
  − Successfully replicated the MMN/P300 effect

IDG/McGovern Institute for Brain Research | Peking University   2019.3 - Present
· **Advisor:** Prof. Luo, Huan (PI)
· **Project (Independent): Sequential Working Memory (Link)**   2019.4 – Present
  − Designed an EEG experiment to explore the neural mechanism underlying the manipulation of contents in auditory working memory and collected data from 16 subjects (Codes)
  − Pre-processed the data with EEGLAB and analyzed the results with Fieldtrip
  − Learned the rationale of cluster-level permutation test and applied it to ERP analysis, result being consistent with (Albouy et al., 2017); helped fix a bug in Fieldtrip during the process
  − Working on the time-frequency analysis currently (Codes)
  − Wrote an intensive review about the temporal organization in working memory, and another for the computational models and functions of neural oscillation in attention and working memory (Link)

- **Working Memory Decoding Analysis (Link)**   2019.3
  - − Implemented an inverted encoding model based on an EEG visual working memory experiment
  - − Reconstructed the tuning curve for the orientation of two Gabor stimuli
  - − Practiced MATLAB programming and multivariate pattern analysis (MVPA) through self-learning

PROGRAMMING PROJECTS

Training a Deep Neural Network on CIFAR-10 (Link)   **2019.12**
- Trained a ResNet-20 model from scratch on CIFAR-10 dataset and achieved high accuracy
- Practiced DNN implementation with Keras and TensorFlow (self-taught within one week)

Visualization of NSFC Funding 2018 (Link)   **2019.10**
- Visualized the National Natural Science Foundation of China (NSFC) funding allocation and revealed the hidden disparity among different academic institutions and regions in China
- Practiced front-end programming (HTML/CSS/JavaScript/SVG/D3.js, self-taught within one week)
- Acquired visualization skill to facilitate high-dimensional big data analysis

ACTIVITIES

Summer Program for Neural and Cognitive Science | Tsinghua University   2019.8
- Learnt about the principles, methodology and frontiers of neuroscience (Details)

RELEVANT COURSES

Neuropsychology (96/100)
- Anatomy, function and diseases of the cortex and the thalamus

The Brain and Cognitive Science (92/100)
- Sensation and perception, language, problem solving and deduction, etc.

Probability Theory and Statistics (90/100)
- Bayes theorem, central limit theorem, parameter estimation, hypothesis testing, ANOVA, regression, etc.

Experimental Psychology (90/100)
- Experiment design, psychophysical methods, memory, social cognition, etc.

Computational Neuroscience (89/100)
- Hodgkin-Huxley equations, E-I balanced network, continuous attractor network, etc.

Computational Perception and Scene Analysis (86/100)
- Physiological, psychological and computational models for vision and audition

Signals and Systems (84/100)
- Continuous and discrete Fourier Transform, Laplace and z Transform, filtering, etc.

Introduction to Pattern Recognition (83/100)
- Bayes decision theory, SVM, logistic regression, artificial neural network, decision tree, clustering, PCA, etc.

SKILLS

- **Programming**: C/C++, Python (NumPy, TensorFlow, OpenCV), MATLAB (EEGLAB, Fieldtrip, Psychtoolbox), HTML, CSS, JavaScript, SVG, R & SPSS (expected this semester)
- **Electrophysiology**: EEG recording, ERP & time frequency analysis, multivariate pattern analysis, dynamic general linear model, cluster analysis, phase coupling analysis