Dr Andrew X. Stewart, Ph.D

Computational Neuroscience
Center for Mind and Brain
University of California, Davis

267 Cousteau Place
Davis, CA 95618

Email: axstewart@ucdavis.edu
Lab page: http://mindbrain.ucdavis.edu/people/axs
LinkedIn: https://www.linkedin.com/in/andrewxstewart
Phone: +1 (619)-576-5531

Education

Ph.D in Neuroinformatics - University of Edinburgh, 2015. **Assessing EEG neuroimaging with machine learning.** We examined advanced analysis of EEG data using a combination of machine learning tools, particularly Independent Component Analysis (ICA) and Support Vector Machines, to find separable sources of variation in the data, and assess how well data from different sources (spatially, temporally, and in the power dynamics) could predict aspects of visual classification tasks for the subject. This revealed surprisingly high accuracy classification of visual state when using a specific set of ICA sources.

MSc in Neuroinformatics - University of Edinburgh, 2009. GPU-based acceleration of an EEG brain-computer interface. Here, I used the parallel power of computer graphics cards to tailor and reimplement a machine learning algorithm. This increased the EEG processing speed 100-fold, thus greatly improving a brain-computer interface.

MSc in Neuroscience - University of Edinburgh, 2008. Calcium-imaging as a metric of real-time neural activity on novel patterns in wet neural network. Here, rat neurons were grown on an etched selectively-adhesive surface in order to induce various topologies of neuronal connections. Neural activity was then measured with calcium-imaging microscopy.

BSc Hons in Biomedical Sciences - University of Edinburgh, 2007.

Employment

Postdoctoral Researcher and Lead Research Software Developer in neuroimaging analysis at the Center for Mind and Brain, University of California Davis, current

Postdoctoral Research Associate in neuroimaging and statistics at the Brain Research Imaging Centre, University of Edinburgh, Aug 2013 – Oct 2015.

University of Edinburgh tutor and teaching assistant for programming, applied machine learning, and probabilistic modelling and reasoning instruction. 2009–2015

Ness Foundation genetic research lab, investigating schizophrenia genotyping and metabolic indicators 2006

Personal

I am a passionate neuroscientist who has found great utility in use of empirical methods and sensible use of new technology in the process of investigating the brain. I have a strong computing background

with experience in Matlab, Python, OpenCL, C for CUDA and a little C and C++. I wish to work well to sensibly improve the world, and am seeking the best ways of doing so.

Publications

Journal Articles

Bradford, M., Law, M. H., **Stewart**, A., Shaw, D. J., Megson, I. L., Wei, J. (2009). The TGM2 gene is associated with schizophrenia in a British population. American Journal of Medical Genetics https://doi.org/10.1002/ajmg.b.30813

Stewart, A. X., Nuthmann, A., Sanguinetti, G. (2014). Single-trial classification of EEG in a visual object task using ICA and machine learning. Journal of Neuroscience Methods. https://doi.org/10.1016/j.jneumeth.2014.02.014

Stewart, A., Rousselet, G., Pernet, C. (2014). The LIMO EEG toolbox : extending the statistical analysis of EEG data to the spectral domain. 20th Annual Meeting of the Organization for Human Brain Mapping (OHBM)

Kappenman, E. S., Farrens, J. L., Zhang, W., **Stewart**, A. X., Luck, S. J. (2020). ERP CORE: An Open Resource for Human Event-Related Potential Research. PsyArXiv. https://doi.org/10.31234/osf.io/4azqm

Luck, S. J., **Stewart**, A. X., Simmons, A. M., Rhemtulla, M. (2020). Standardized Measurement Error: A Universal Measure of Data Quality for Averaged Event-Related Potentials. PsyArXiv, https://doi.org/10.31234/osf.io/dwm64

Project contributions

ERPLAB EEG analysis tool - software to process, analyze and display event-related activity from EEG, developed with Prof Steve Luck at UC Davis `https://github.com/lucklab/erplab`

Director with the Convergence Analysis research group on promoting safe use of AI. `http://convergenceanalysis.org/`

Neuroglycerin - group predicting seizure occurrence using machine learning of EEG data. Top 3% on Kaggle. `https://www.kaggle.com/c/seizure-prediction/leaderboard`

LIMO EEG statistics package - now included with EEGLAB: As part of my postdoc with BRIC, Cyril Pernet, Guillaume Rousselet, and Arno Delorme, I wrote a new version of the LIMO EEG stats tools to examine EEG data in ERSP space, ITC, high-dimensional analysis, and greatly improved the speed of these tools.
`https://github.com/LIMO-EEG-Toolbox/limo_eeg/graphs/contributors`

Conference contributions

Attendee of Neural Information Processing Systems (NIPS / NeurIPS) conference, and AI-neuroscience co-workshop in Montreal, 2019

Senior Fellow of the 2018 Kavli Summer Institute for Cognitive Neuroscience, contributing to the new Cognitive Neuroscience textbook with Michael Gazzaniga, Richard Ivry, and Ron Mangun.

Fellow of the 2017 Kavli Summer Institute for Cognitive Neuroscience.

Speaker at the Effective Altruism Global 2016 conference in Berkeley. Along with Justin Shovelain, we presented possible models of AI scenarios from Convergence Analysis.

Mentor with the CFAR Rationality training program, Berkeley, 2016-2017. `rationality.org`

Presenter at the Asilomar 2016 Brain-Computer Interface conference.

Speaker at the 2016 Northern California Consciousness (NCC) conference.

Instructor at the EEGLAB workshop at Aspet, France 2013

Speaker at Neural Engineering Young Researchers, Royal Academy of Engineering, Warwick 2012

EEGLAB workshop at Swartz Center for Computational Neuroscience, UCSD 2010

Presented a poster at Society for Neuroscience, San Diego 2010

Talk at International Workshop on Advances in Electrocorticography, Wadsworth Center, New York 2009

Presented a poster at FENS Forum of Neuroscience, Geneva 2008

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`https://www.linkedin.com/in/andrewxstewart`