Matthias Christenson, PhD

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Summary

Experienced computational scientist with a PhD from Columbia University and expertise in machine learning and probabilistic models. Experienced in designing, maintaining, and scaling database systems and analysis pipelines. Shared research through peer-reviewed publications and on GitHub. Eager to apply my skills to new challenges in finance, healthcare, and artificial intelligence.

Education

Columbia University (CU) *New York, USA*
PhD Neurobiology and Behavior *02/2023*

GPA	3.95
Thesis	*"Mechanisms of color coding in insects"*
Advisors	Profs. Rudy Behnia and Larry Abbott

University College London (UCL) *London, UK*
MSci/BSc Neuroscience *07/2016*

Grade	1st class honours (4.00 GPA)
BSc Thesis	*"Synaptic plasticity and its role in information processing in the cerebellum"*
MSci Thesis	*"Synaptic mechanisms of sparse activity in the hippocampus"*
Advisors	Profs. Angus Silver (BSc) and Michael Häusser (MSci)

Experience

Zuckerman Institute & Center for Theoretical Neuroscience, CU *New York, USA*
Postdoctoral Research Scientist *12/2022 – present*
Doctoral Research Scientist *08/2017 – 11/2022*

- Independently drove research direction incl. *3+* funded research proposals (total of *$200k* funded)
- Developed computationally efficient models to extract patterns from complex time-series data
- Adapted state-of-the-art ML models (autoencoders) to reduce SNR of noisy imaging data *30-fold*
- Simulated biological circuits using RNNs to develop and test neuroscientific theories
- Developed graphical models that accurately predicted the activity of unobserved neural signals
- Built and maintained computational infrastructure and data pipelines | Led code review
- Managed projects of four master students, two software developers, and one junior PhD student
- Presented and published my work at *10+* international conferences and top (Q1) science journals
- Invited to review *3+* research papers in Q1 journals as a computational neuroscientist expert

House of Crops Unamera *Remote*
Data Scientist (part-time) *05/2020 – 06/2021*

- Built custom ML models that improved price prediction by *500%* across local German crop markets
- Scraped, standardized, and analyzed data of crop price points from different online sources
- Implemented dashboards and automated emails for the team to view price data and predictions

Neural Computation Häusser Group, UCL *London, UK*
Undergraduate Researcher (part-time) *09/2013 – 07/2016*

- Identified synaptic mechanisms underlying spike events in neurons of behaving rodents
- Automated analysis of animal behavior in a closed-loop RL task using computer vision
- Increased the efficiency of our bootstrapping algorithms *100-fold* to rapidly detect spike events

Skills & Interests

Overall	Machine Learning, Quantitative Research, Project Management, Software Development, Technical Writing & Science Communication
Programming	7+ YEX with Python (including pytorch, sklearn, pandas, pyro, cvxpy, HuggingFace); Experience with Git, Bash, Unix, SQL, Docker, Javascript, C++
Languages	English (native), German (native), Spanish (working proficiency), French (basic)
Interests	Ski Mountaineering, Strategic Board Games, Ballroom Dancing

Selected Publications & Presentations

Christenson[c], Mousavi, Oriol, Heath, Behnia[c] PHIL. TRANS. R. SOC. (2022)
" Exploiting color space geometry for visual stimulus design across animals "

Ganguly[1], **Christenson**[1], Behnia COSYNE (2022)
" Normative models of spatio-spectral decorrelation predict observed receptor distributions "

Heath[1], **Christenson**[1], Oriol, Saavedra-Weisenhaus, Kohn, Behnia CURRENT BIOLOGY (2020)
" Circuit Mechanisms Underlying Chromatic Encoding in Drosophila Photoreceptors "

[1]first authors, [c]corresponding author

Honors & Awards

CoSyNe Presenters Award (2020): Award for top scored abstract
NIH T32 Vision Grant (2019 & 2020): Research grant for my doctoral studies
Cold Spring Harbor Asia Stipend (2018): Travel stipend to attend the CCNSS at CSHA
Burnstock Prize (2016): Prize for best in class performance
Dean's List (2015 & 2016): Commendation for excelling in the neuroscience program
UCL ChangeMakers Stipend (2015): Stipend for a podcast on SotA techniques in neuroscience
Physiological Society Studentship (2015): Grant for my research in the Neural Computation Group

Open-source Projects

dreye: Experiment design tool for color vision
Optimization procedures I developed for building colored stimuli for any model organism.
loris: Data management and analysis web application
Application I designed for the Behnia lab to manage and track inventory and biological experiments.
puffbird: Dataframe manipulation tool
A simple productivity tool I developed to format highly nested pandas.DataFrame objects.
Auto-GPT: Experimental project to make GPT4 autonomous
Contributed an audio-to-text feature to this open-source project.
scidoggo: Collection of ML models
Selection of my custom research models made accessible for general use (work in progress).
datajoint: Relational data pipelines for the science lab
Contributed some bug fixes and extended the functionality of datajoint in my own fork.

Teaching & Coursework

Teaching	Python for Neuroscience: ML tools and data pipelines (2020/21) | BrainBee Learning and Memory (2019) | Scientific Python Class (2016)
Rel. Coursework	Graphical Models (2019) | Theoretical Neuroscience I/II (2017/18) | Statistical Analysis of Neural Data (2017) | Dynamical Systems (2015) | AI and Neural Computing (2015) | Neural Computation (2015)
Summer Schools	Neuromatch Deep Learning (2021) | CSH Asia Comp. & Cog. Neuroscience (2018)