MARGOT WAGNER

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machine learning · neuropsychiatry · data science · artificial intelligence · healthcare

EDUCATION

2023 **University of California, San Diego**
Ph.D. in Bioengineering, specialization in computational neuroscience
- Advisors: Gert Cauwenberghs and Terrence Sejnowski
- microMBA certification received from Rady School of Management (*2021)*

2020 **University of California, San Diego**
Master of Science in Bioengineering
- Select coursework: Deep Learning, Probabilistic Reasoning, Web Mining, & Recommenders

2018 **University of Delaware**
Bachelor of Engineering in Chemical and Biomolecular Engineering (Honors with Distinction)
- Studied at National University of Singapore on exchange, 1 of 2 selected students

RESEARCH & PROFESSIONAL EXPERIENCE

2019 – 2023 **Graduate Student Researcher**
The Computational Neurobiology Lab and Integrated Systems Neuroengineering Lab
- Created and lead ABCDeepLearn research group within CNL/ISNL (see Leadership sec)
- Developed automated neuroimaging structure and directed functional connectivity biomarker pipeline for use in large MRI datasets using deep learning segmentation
- Built and optimized distributed 3D-CNN and STGCN models for classification of MRI data and derived functional connectivity graphs to predict depression
- Applied pipeline to obtain depression biomarkers in >2,000 adolescent subjects
- Built scalable Markov graph model of synaptic transmission for biophysically-based artificial neural networks, decreasing runtime by 93%

2022 – 2023 **Machine Learning Researcher (Consultant)**
OPTT Health
- Trained and optimized transformer NLP models applied to psychotherapy text for mental health symptom prediction, achieving clinical performance of 74% F1 score

2021 **Consulting Analyst**
Mindful Care
- Analyzed market fit for psychotherapy AI tech collaborating on a team of 6 analysts

2021 **Computer Science Research Mentorship Program Participant**
Google
- Designed psychiatric healthcare machine learning project with a Google researcher

2019 **Visiting Researcher**
Simula Research Laboratory *Oslo, Norway*

- Simulated large-scale biological artificial neural network with international research team in exclusive Computational Physiology Summer School program

2018 – 2019 **Graduate Student Researcher**
Rotating Labs
- Developed machine learning models to classify attention states using EEG data from 27 patients, achieving 70% accuracy for use in ADHD diagnostics (NEATLabs)
- Applied nonlinear dynamical system embeddings to classify cognitive responses in Parkinson's patients (CNL)
- Designed and ran pilot study for EEG reading comprehension experiment and created data analysis pipeline including ICA to locate biomarkers for use in classroom applications (ISNL)

LEADERSHIP AND MENTORING EXPERIENCE

2022 – 2023 **ABCDeepLearn Research Team Lead**
The Computational Neurobiology Lab and Integrated Systems Neuroengineering Lab
- Devised overall project for improved diagnosis of adolescent depression using ABCD study
- Recruite and manage 3 teams consisting of 2 postdocs, 4 PhD students, and 4 undergrads
- Design weekly sprints across 3 different projects related to machine and deep learning
- Applied for R21 funding to support team for secondary analysis

2018 – 2020 **Co-Founder and Co-Director of Science in Society Seminar Series**
the Collaboratory Center, Institute of Neural Computation
- Organized expert-run public seminars and student roundtables covering science behind societal issues to the general public (attendance >200 people) with Roger Bingham

2019 – 2020 **High School Outreach Chair and Mentor**
Bioengineering Graduate Society, UCSD
- Created and taught biological data science curriculum for 30 high school students
- Mentored 4 first-year graduate students with monthly one-on-one meetings

2019 – 2020 **Teaching Assistant**
University of California San Diego
- Ran lab and discussion with 30 undergraduate students (BENG 1) and 50 graduate students (BENG 260) collecting and analyzing biomedical datasets and running simulations

2018 – 2020 **Research Mentor**
Maine South High School *Park Ridge, IL*
- Instructed 12 high schoolers in designing and executing research projects to compete at the Illinois Junior Academy of Science and the Intel Science Fair

2018 – 2019 **Science Outreach Teacher Volunteer**
Lafayette Elementary School
- Designed and taught 3rd grade curriculum to underprivileged and disabled students

2016 – 2018 **Writing Fellow (Volunteer)**
University of Delaware Honors Program
- Advised honors freshman English course (30 students) one-on-one on developing writing and communication skills throughout the semester

SELECT PROJECTS

- Wrote the backend and logic for an application tracking and monitoring medication usage in polypharmacy patients, including reminders and warnings for potential drug interactions (MedHacks Hackathon, 2nd place)
- Implemented variational autoencoder sentence generator for 3 conditions and classified generated sentences using BERT classifier
- Analyzed 7k gene RNA-seq dataset from Allen Brain Atlas using ICA, PCA, clustering, and classification to predict brain regions (98.7% accuracy for 3 regions, 67.1% accuracy for 10 regions)
- Predicted collision severity (66.25% acc, 5 classes) using 5.78 GB traffic records with ~100 features from 2001-2020

SKILLS

Programming Languages Python · Java · C++ · MATLAB · SQL · Bash
Software Tools Git · Linux · PyTorch · scikit-learn · Hugging Face · Ray Tune · WandB

HONORS AND AWARDS

2021 MedHacks Hackathon, 2nd Place
2018 NSF Graduate Research Fellowship Program Award
2017 Benjamin E. Herring Scholarship
2017 Myrick Family Scholarship
2016 General Honors Award
2014 Telkes Distinguished Scholar Award — *4-year full tuition scholarship*

PUBLICATIONS & PRESENTATIONS

JOURNAL PUBLICATIONS

- **M Wagner**, J Jagayat, A Kumar, A Shirazi, N Alavi, M Omrani, "Using natural language processing as a scalable mental status evaluation technique," Sept 2023 [submitted].
- A Ojeda, **M Wagner**, V Maric, D Ramanathan, and J Mishra, "EEG source derived salience network coupling supports real-world attention switching," *Neuropsychologia*, vol 178, no 108445, Jan 2023.
- **M Wagner**, T Bartol, T Sejnowski, and G Cauwenberghs, "Markov abstractions of electrochemical reaction-diffusion in synaptic transmission for neuromorphic computing," *Front Neurosci*, vol 15, no 698635, Nov 2021.
- J Forder, M Smith, **M Wagner**, R Schaefer, J Gorky, K van Golen, A Nohe, and P Dhurjati, "A physiologically-based pharmacokinetic model for targeting calcitriol-conjugated quantum dots to inflammatory breast cancer cells," *Clin Transl Sci*, vol 12, pp 617-624, July 2019.

CONFERENCE POSTERS

- **M Wagner**, A Camassa, B Liu, Y Chen, T Sejnowski, "Altered functional connectivity in depressed adolescents: Insights from the ABCD study," *Society for Neuroscience*. Nov 2023 [accepted].
- **M Wagner**, B Liu, A Camassa, S Bansal, G Cauwenberghs, T Sejnowski, "Spatio-temporal Graph Convolution Network for Automatic Diagnosis of Adolescent Depression from Functional Connectivity," *NeurIPS Temporal Graph Learning Workshop*. Dec 2023 [submitted].
- **M Wagner**, K Gano, A Balaji, A Camassa, G Cauwenberghs, T Sejnowski, "Supervised and Unsupervised Machine Learning Analysis of Adolescent Depression Using Structural Neuroimaging Data," *NeurIPS Medical Imaging Meets NeurIPS Workshop.* Dec 2023 [submitted].
- **M Wagner**, B Liu, A Camassa, G Cauwenberghs, T Sejnowski, "Automated Neuroimaging Pipeline to Identify Structural Biomarkers using Deep Learning Segmentation Applied to Adolescent Mental Disorders," *NeurIPS Medical Imaging Meets NeurIPS Workshop.* Dec 2023 [submitted].
- **M Wagner**, A Uppal, M Rognes, T Bartol, T Sejnowski, G Cauwenberghs, "Scalable Markov Models of Synaptic Reaction-Diffusion for Mapping Molecular Models to Neural Networks," *NeurIPS AI 4 Science Workshop.* Dec 2023 [submitted].

- **M Wagner**, A Camassa, and T Sejnowski, “Primary predictors of anxiety and depression in adolescents in response to COVID-19,” *Technology in Psychiatry Summit*, Oct 2022.
- **M Wagner**, J Jagayat, A Kumar, A Shirazi, N Alavi, M Omrani, “Psychotherapy sentiment analysis using natural language processing,” *Technology in Psychiatry Summit*, Oct 2022.
- **M Wagner**, T Bartol, T Sejnowski, and G Cauwenberghs, “Towards biophysically-based neuromorphic computing at scale: Markov abstractions of electrochemical reaction-diffusion in synaptic transmission,” *Society for Neuroscience*, Jan 2021.
- **M Wagner**, T Bartol, T Sejnowski, and G Cauwenberghs, “Towards biophysically-based neuromorphic computing at scale: Markov abstractions of electrochemical reaction-diffusion in synaptic transmission,” *IBM IEEE AI Compute Symposium*, Oct 2020.
- **M Wagner**, T Bartol, T Sejnowski, and G Cauwenberghs, “Markov abstractions of biochemical stochastic reaction-diffusion models of synaptic transmission for efficient neuroscientific simulations,” *Technology in Psychiatry Summit*, Oct 2020.
- **M Wagner**, T Bartol, T Sejnowski, and G Cauwenberghs, “Towards biophysically-based neuromorphic computing at scale: Markov abstractions of electrochemical reaction-diffusion in synaptic transmission,” *Salk at Seaside*, Oct 2020.
- **M Wagner** and M Tzanakakis, “Predictive cell ensemble model for the differentiation of stem cells,” *Tufts University Systems Biology and Data Science REU Symposium*, Aug 2017.

THESES

- **M Wagner**, “Multiscale spatiotemporal probabilistic graph models for neuropsychiatry applications: scaling theoretical frameworks to data-driven diagnostics from molecules to minds,” PhD thesis, University of California San Diego, 2023.
- **M Wagner**, “A physiology-based pharmacokinetic approach to calcitriol quantum dot distribution for use in inflammatory breast cancer treatment,” Senior thesis, University of Delaware, 2018.

INVITED TALKS

- The Society for Neuroscience. *The Adolescent Brain* [Press conference]. Nov 2023 [accepted].
- **M Wagner**, A Camassa, and T Sejnowski, “ABCDeepLearn: Using neuroimaging data to detect and classify depression,” *Neurodinner*. June 2023.

OTHER PUBLICATIONS

- **M Wagner**, “Generalized Anxiety Disorder,” *Neuwrite: San Diego*. Oct 2020.

CONFERENCE ATTENDANCE

2019 – 2023	Society for Neuroscience Annual Conference (excl 2020)
2022	NeurIPS
2020, 2022	Technology in Psychiatry Summit
2019, 2022	IEEE EMBS Brain, Mind, and Body Symposium
2020	IBM IEEE AI Compute Symposium
2020	Salk at Seaside