Akif Erdem Sağtekin

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Education

08.2022 - 09.2024 Tübingen
M.Sc in Computational Neuroscience
University of Tübingen
Thesis: Error Forcing in Recurrent Neural Networks | Supervisor: Prof. Cristina Savin

09.2018 - 06.2022 Istanbul
B.Sc in Electronics and Communication Engineering
Istanbul Technical University, GPA: 3.55/4.0
Thesis: Cortical layer interactions in spiking neural networks during perceptual decision making task | Supervisor: Prof. Neslihan Serap Şengör

Research Experience

11.2024 – ongoing New York City
Flatiron Institute Center for Computational Neuroscience
NeuroStats Lab, Researcher (PI: Alex Williams, co-advised by Cristina Savin)
- Working on developing reliable metrics for comparing dynamical systems from data to identify whether different systems (e.g., circuit dynamics in two animals) perform the same function.

04.2024 – 09.2024 New York City
New York University Center for Neural Science
Cristina Savin Lab, Master's Thesis
- Proposed a novel learning mechanism emphasizing the importance of feedback signals' direct effect on neuronal activities besides plasticity for fast and accurate learning.
- Analytically showed how the proposed mechanism uses task error to control exploding gradients via damping the Jacobian product norm. Preprint in preparation.

10.2023 – 04.2024 Tübingen/Germany
Max Planck Institute for Intelligent Systems
Jakob Macke Lab, M.Sc Lab Rotation
- Worked on a project proposing a machine learning method to infer mechanistically interpretable models from neural data. Applied the model to rat hippocampal spike data.
- Used variational sequential Monte Carlo methods and generalized teacher forcing. Implemented multi-modal VAEs, which allows joint inferring of the underlying latents of LFP and spike data.

08.2023 – 10.2023 Tübingen/Germany
Max Planck Institute for Biological Cybernetics
Peter Dayan Lab, M.Sc Short Lab Rotation
- Wrote a literature review on reinforcement learning in biological neural networks.
- Studied policy-gradient methods, temporal-difference framework, and actor-critic learning in spiking neural networks. Their relevance with three-factor learning is investigated.

08.2022 - 08.2023 Tübingen/German
Tübingen AI Center
Self-organization and Optimality in Neuronal Networks, M.Sc Res. Asst. (PI: Anna Levina)
- Presented a poster at Bernstein Conference 2023.
- Worked on the interplay between co-tuning and anti-tuning mechanisms for excitatory/inhibitory balance.

06.2022 - 02.2023 Istanbul/Turkey
Istanbul Technical University
MathNeuro, B.Sc Res. Asst. (Supervisor: Anton Chizhov)
- Contributed to a paper on a novel single-neuron model published in Biological Cybernetics.
- Compared Hodgkin-Huxley, Izhikevich, AdEx, and CAdEx single neuron models with our proposed model and dynamic clamp experimental data.

10.2019 - 06.2022 Istanbul/Turkey
Istanbul Technical University
Neuroscience Modelling and Research Group, Bachelor's Thesis (PI: Neslihan Serap Sengor)
- Contributed to the Brian2 library by implementing the code of a paper (Izhikevich, 2003).
- Studied the cortical laminar interactions in perceptual decision making mechanism and analyzed the obtained spiking neural network model.

09.2020 – 06.2021 Istanbul/Turkey
Istanbul Technical University AI Center
Ure Lab, B.Sc Res. Asst. (PI: Nazim Kemal Ure)
- Worked on navigation systems for UAVs using sequential Kalman filters.

Teaching Experience

08.2023 - 03.2024 Tübingen
Teaching Assistant
- Neural Dynamics (Textbook: Theoretical Neuroscience, L. F. Abbott and P. Dayan)
- Neurophysiology

10.2021 - 01.2022 Istanbul
Teaching Assistant
- Artificial Neural Networks (Textbook: Neural Networks and Learning Machines, S. S. Haykin)

Publications & Poster Presentations

[1] Sagtekin, A.E., Bredenberg, C., Savin, C. (in preparation). Error Forcing in Recurrent Neural Networks. Preprint, to be posted on arXiv.

[2] Pals, M., **Sagtekin, A.E.**, Pei, F., Gloeckler, M., Macke, J.H. (2024). Inferring stochastic low-rank recurrent neural networks from neural data. The Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS). arXiv:2406.16749

[3] Sagtekin, A.E., Giannakakis E., Levina A. (2023). Emergent E/I anti-tuning and balance during surrogate gradient learning. Poster presented at Bernstein Conference. 10.12751/nncn.bc2023.074

[4] Bischoff, S., [and 20 others including **Sagtekin, A.E.**] (2024). A Practical Guide to Sample-based Statistical Distances for Evaluating Generative Models in Science. Transactions on Machine Learning Research (TMLR). arXiv:2403.12636

[5] Chizhov, A.V., Amakhin, D.V., **Sagtekin, A.E.**, Mathieu Desroches. (2023). Single-compartment model of a pyramidal neuron, fitted to recordings with current and conductance injection. Biological Cybernetics. 10.1007/s00422-023-00976-7

Awards and Achievements

2022 - 2024	DAAD Scholarship for fully funded MSc in Germany - ∼25.000€
2021 - 2022	Chobani Scholarship (awarded to 25 students among 50k applicants) - ∼6.000TL
2020 - 2021	Turkey Technology Foundation Scholarship - ∼1.000$
2018 - 2019	Istanbul Technical University Scholarship - ∼1.200$
2018 - 2022	Dean's List
06.2018	Ranked in the top 0.1% among 2 million applicants in the national university entrance exam
06.2014	Ranked in the top 0.1% among 1.5 million applicants in the national high school entrance exam
06.2010	Admitted to the Turkish Science Center's Special Education Institute

Summer Schools & Review Activities

Summer Schools:	Analytical Connectionism 2024, NeuroMatch 2021
Peer Review Activities:	International Conference on Learning Representations (ICLR) 2024

Skills

Programming:	Python (PyTorch, Brian2), Git, MATLAB, C++, C
Languages:	English (Fluent), German (A2), Turkish (Native)
Certificates:	FELASA Animal Handling

Leadership & Service

10.2024	Teacher & mentor for high school students
2023-24	Student representative for Computational Neuroscience MSc at the University of Tübingen
2023-24	Interviewed by German Academic Excellence Service (in German)
2022-24	Founded a computational neuroscience journal club for MSc students at the University of Tübingen
Winter 2021-22	Founded a computational neuroscience study group at Istanbul Technical University
Curriculum	• Gave lectures from the textbook 'Theoretical Neuroscience' by P. Dayan and L. F. Abbott
Summer 2021-22	Presentation: The concept of modeling and using math to explain the brain
Link	• Gave a public talk about computational neuroscience in TURING, a public cultural organization.
2021-22	Co-organized a book club, and raised money to donate to families with financial hardship.
2021-22	Teacher and curriculum organizer for primary school students at Turkish Technology Foundation
2020-21	Teacher for high school students at Project Another Way