

Gudrun L. Thorkelsdottir

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Education

University of Illinois at Urbana-Champaign

2024 - ongoing

- Second year PhD student, Siebel School of Computing and Data Science
- Advised by Dr. Arindam Banerjee
- GPA: 4.0/4.0

University of Maryland, College Park

2019-2023

- B.Sc., Computer Science
- B.Sc., Mathematics
- Banneker/Key 4-year Full Merit Scholarship Recipient
- Leidos Corporate-Sponsored Scholarship through the National Merit Scholarship Corporation
- Advanced Cybersecurity Experience for Students (ACES) Honors Program
- GPA: 3.865/4.0

Publications

- **Gudrun Thorkelsdottir**, Arindam Banerjee. *Gradual Fine-Tuning for Flow Matching Models*. Preprint. [Arxiv](#). 2026.
- Jiajun Fan, **Gudrun Thorkelsdottir**, Anirudh Choudhary. *Rethinking Reinforced Fine-tuning of Protein Language Models: A Percentile-based Approach to Diversity Preservation*. [Website](#). 2024.
- Samuel Dooley, Ryan Downing, George Wei, Nathan Shankar, Bradon Thymes, **Gudrun Thorkelsdottir**, Tiye Kurtz-Miott, Rachel Mattson, Olufemi Obiwumi, Valeria Cherepanova, Micah Goldblum, John P Dickerson, Tom Goldstein. *Comparing Human and Machine Bias in Face Recognition*. [Arxiv](#). 2021.
- Fu, Y. Yogurtcu, O. Kothari, R. **Thorkelsdottir**, G. Sodt, A. Johnson, M. *An Implicit Lipid Model for Efficient Reaction-Diffusion Simulations of Protein Binding to Surfaces of Arbitrary Topology*. The J. Chem. Physics. 151(12): [124115](#), 2019.

Awards and Honors

- UIUC Ray Ozzie Fellowship 2025
- Outstanding Poster Award Winner at the National Institutes of Health Postbac Poster Day 2024
- Recipient of UMD's Banneker/Key 4-year Full Merit Scholarship. 2019 - 2023
 - Awarded to <0.5% of each incoming class.
- Recipient of the Leidos Corporate-Sponsored Scholarship through the National Merit Scholarship Corporation. 2019 - 2023
 - Awarded to <1% of all PSAT/NMSQT takers.
- Citation Recipient, Advanced Cybersecurity Experience for Students, UMD Honors College. 2021
- UMD College of Computer, Mathematical, and Natural Sciences Dean's List. 2019 - 2023
 - Seven-time awardee.

Research Experience

University of Illinois Urbana-Champaign, <u>Dr. Arindam Banerjee</u>	2025-ongoing
<ul style="list-style-type: none">Position: PhD StudentDesigning a novel, theoretically-motivated fine-tuning framework specialized for flow-matching generative models.Responsible for ensuring the accuracy and efficiency of the framework by leveraging the base model's learned dynamics.Testing the proposed framework against existing baselines in the field to ensure its efficacy.Work to be submitted to the International Conference on Machine Learning, 2026.	
University of Illinois at Urbana-Champaign, <u>Dr. Arindam Banerjee</u>	2025
<ul style="list-style-type: none">Position: Rotation StudentSought to produce optimal initial states for weather forecasting systems by designing an efficient flow matching data assimilation model.Improved upon a baseline diffusion model by applying flow matching to assimilate sparse atmospheric observations with forecast predictions to efficiently obtain accurate global state estimates.Currently working on the implementation and testing of the framework.	
University of Illinois at Urbana-Champaign, <u>Dr. Ravishankar Iyer</u>	2025
<ul style="list-style-type: none">Position: Rotation StudentDesigned a detailed framework for modeling cancer grade progression in histopathology images using flow-based generative modeling and techniques from unpaired image translation.Curated a multi-distribution dataset of histopathology images at increasing cancer grades from publicly available data.	
University of Illinois at Urbana-Champaign, <u>Dr. Ge Liu</u>	2024
<ul style="list-style-type: none">Position: Rotation StudentDeveloped a comprehensive plan for solving the inverse problem of correcting heterogeneity in local resolution in cryo-EM maps with the goal of aiding in generating accurate protein atomic models.Conducted an extensive literature review to design the problem setup and formulate an initial implementation plan.Currently working on the implementation of a flow-based denoising model.	
Cancer Data Science Laboratory, National Cancer Institute, NIH, <u>Dr. Peng Jiang</u>	2022 - 2024
<ul style="list-style-type: none">Position: Postbac Research FellowAssembled datasets consisting of histopathology images from cancer patients and their associated spatial transcriptomics readouts.<ul style="list-style-type: none">Combined datasets totaling over 100 images with associated labels, including gene expression, immune cell type fractions, and cytokine signaling levels.Developed a multi-task deep learning model to classify immune cell types in histopathology image data labeled using spatial transcriptomics datasets.Adapted the model to predict additional types of spatial transcriptomics data, including cytokine signaling levels and gene expression information.Improved the prediction accuracy of select classes from a Pearson correlation coefficient of ~0.3 to ~0.6 over the scope of the project.	
University of Maryland, <u>Dr. Furong Huang</u>	2023
<ul style="list-style-type: none">Position: Graduate Course StudentCollaborated with a PhD student to study the applications of generative methods to engineering design.	

- Evaluated the performance of a generative adversarial network on airfoil shape optimization through performance comparison to a denoising diffusion model.
- Co-authored an academic report of the literature review, methods, and results of this project.

University of Maryland, Dr. Tom Goldstein

2020 - 2021

- Position: Undergraduate Researcher
- Studied the Deep Double Descent (DDD) phenomenon
 - Developed a deep learning model to classify images from the MNIST dataset which consistently displayed DDD behavior, allowing for closer study of the effect.
 - Collaborated with graduate and post-doctoral researchers to study DDD using the model I created.
- Studied bias in AI facial recognition
 - Designed a survey given to 545 participants in order to study bias in human facial recognition based on factors such as perceived race, gender, or age.
 - Analyzed data to compare bias between AI facial recognition models and human facial recognition, observing comparable levels of disparity based on gender and race.
 - Co-wrote a manuscript detailing our methodology and results.

University of Maryland, Dr. James Reggia

2021

- Position: Undergraduate Course Student
- Collaborated with a group of undergraduate students to modify the classical Game Tree Search algorithm for a non-deterministic game with imperfect information.
- Designed and led the implementation of the AI player using our variation of the minimax decision algorithm, which was able to win 933 out of 1000 test games against a random choice baseline.
- Wrote an academic report describing the project and our proposed future work.

National Institute of Child Health and Human Development, NIH, Dr. Alexander Sodt

2018 - 2019

- Position: Summer Research Intern
- Developed a C++ program to simulate interactions between cell membranes and intracellular particles.
- Optimized the simulation using CUDA and by applying features and techniques that include coalesced memory access, prefetching memory, pinning data, and dynamic parallelism.
- Ensured the efficiency of the simulation by maximizing the ratio between memory transfers to and from the GPU and the number of floating point operations.
- Integrated the program with code previously written by members of Dr. Sodt's lab.

Publications, Posters, and Reports

- **Gudrun Thorkelsdottir**, Beibei Ru, Peng Jiang. *Deep Multi-Task Learning to Assess Spatial Gene Expression Predictability Based on Tissue Morphology*. 2024. [Poster](#).
- Cashen Diniz, **Gudrun Thorkelsdottir**. *Application of Generative Methods to Engineering Design - A Comparison of GANs and Denoising Diffusion Models*. 2023. [Report](#).
- **Gudrun Thorkelsdottir**, Kyle Hansen, Mark Bruner, Jerry Lan, Jeffrey Qin. *Modification of Classical Game Tree Search for the Game Mandala*. 2021. [Report](#).

Leadership and Mentoring

- Tutor for low-income high school students through UPchieve. 2023 - 2024
 - Providing easily-accessible online tutoring in relevant STEM subjects.
- Advanced Cybersecurity Experience for Students Honors Program, Peer Mentor 2020 - 2021
 - Offered course and career related guidance and tutoring for first-year students.
- Trip Supervisor at the University of Maryland Adventure Program. 2019 - 2023
 - Responsible for planning and leading outdoor recreation trips for groups of up to 20 participants.

Skills

- Programming Languages
 - Python, C++, Unix Shell Scripting (bash), Java, Matlab, Ruby, OCaml
- Libraries
 - PyTorch, TensorFlow, pandas, NumPy, scikit-learn, SciPy, OpenCV, Matplotlib
- Developer Tools
 - Git, VS Code, Jupyter Notebook, Eclipse