

# Gudrun L. Thorkelsdottir

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## Education

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### 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

## Research Experience

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### University of Illinois at Urbana-Champaign, Dr. Arindam Banerjee

2025 - ongoing

- Position: Rotation Student
- Sought 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, Dr. Ravishankar Iyer

2025 - ongoing

- Position: Rotation Student
- Designed 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.
- Currently working on the implementation and testing of the framework.

### University of Illinois at Urbana-Champaign, Dr. Ge Liu

2024

- Position: Rotation Student
- Developed 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, Dr. Peng Jiang

2022 - 2024

- Position: Postbac Research Fellow
- Assembled datasets consisting of histopathology images from cancer patients and their associated spatial transcriptomics readouts.
  - 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  $\sim 0.3$  to  $\sim 0.6$  over the scope of the project.

University of Maryland, Dr. Furong Huang

2023

- Position: Graduate Course Student
- Collaborated 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.

## Awards and Honors

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- 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.

## Publications, Posters, and Reports

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- Jiajun Fan, **Gudrun Thorkelsdottir**, Anirudh Choudhary. *Rethinking Reinforced Fine-tuning of Protein Language Models: A Percentile-based Approach to Diversity Preservation*. <https://openreview.net/forum?id=rloZJD3KD3>, 2024.
- **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](#).
- Samuel Dooley, Ryan Downing, George Wei, Nathan Shankar, Bradon Thymes, **Gudrun Thorkelsdottir**, Tiye Kurtz-Miott, Rachel Mattson, Olufemi Obiwumi, Valeriia Cherepanova, Micah Goldblum, John P Dickerson, Tom Goldstein. *Comparing Human and Machine Bias in Face Recognition*. *arXiv:2110.08396*, 2021.
- **Gudrun Thorkelsdottir**, Kyle Hansen, Mark Bruner, Jerry Lan, Jeffrey Qin. *Modification of Classical Game Tree Search for the Game Mandala*. 2021. [Report](#).
- Fu, Y. Yogurteu, 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.

## Leadership and Mentoring

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- 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

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- 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