Swagatam Haldar

Curriculum Vitae

swagatam.haldar9@gmail.com
swagatam-haldar-636a41232
0VP-IRoAAAAJ
swag2198
14527267

Research Interests

Probabilistic and Simulation-based inference. Efficient implementation of LLMs. Explainability.

Education

October 2023 – Present **University of Tübingen**, *Tübingen, Germany*
MSc *Machine Learning, Wübben Scholar* Grade (till July 2025): *1.13/1*
Courses so far: Mathematics for ML, Trustworthy ML, Massively Parallel Computing, Probabilistic and Statistical ML, Understanding LLMs, Non-convex optimization for Deep Learning
Master's thesis: AutoML for Simulation-based Inference (ongoing).

2016 – 2020 **Indian Institute of Technology (IIT), Kharagpur**, *India*
Bachelor of Technology (B.Tech), Major in *Electrical Engineering* CGPA: *9.15/10*
Minor in *Computer Science and Engineering* minor CGPA: *9.15/10*

Research Positions

March 2025 – June 2025 **ELLIS Institute, Tübingen**, *Student Research Assistant*, with Dr. Wieland Brendel
Sparse pretraining of dynamic Mixture-of-Experts (MoE) models based on the Tokenformer architecture.

January – July, 2024 **Universitätsklinikum Tübingen**, *Student Research Assistant*, with Dr. Vadim Borisov
Identifying influential species associated with colorectal cancer (CRC) using rule-based models and symbolic regression from microbiome data (in Dr. med. Christoph Stein-Thoeringer's group).

August, 2020 – September, 2023 **IBM Research, Bangalore, India**, *Research Software Engineer*
Worked on problems in explainability (understanding model differences (**UAI 2023**), certifying existing explanations (**ICML 2024**)), individual fairness (in tabular and Speech-to-Text settings), API testing and foundation models pretraining that resulted in multiple papers and patents.

Selected Research Projects

May 2025 – Ongoing **AutoML for Simulation-based Inference (SBI)**, *Master's thesis*, with Dr. Jakob H. Macke, Dr. Katharina Eggensperger & Guy Moss
Working on automating the SBI pipeline involving different posterior inference methods and performance metrics for easy application on new inference tasks. Poster for the AutoML summer school.

Sept. 2024 – Feb. 2025 **Sequential Source Density Estimation**, *Research project*, with Guy Moss and Dr. Jakob H. Macke
Implemented a sequential source distribution estimation method that is demonstrably 30-50% simulation efficient compared to the non-sequential variant. [Report] [Code]

Papers

C = Conference, B = Book chapter A = arXiv preprint/under review [Google scholar]

[A2] **Swagatam Haldar**, Christoph Stein-Thoeringer, Vadim Borisov. "*Interpreting Microbiome Relative Abundance Data Using Symbolic Regression*," 2024. [arXiv] [Code]

[C2] Amit Dhurandhar, **Swagatam Haldar**, Dennis Wei, Karthikeyan Natesan Ramamurthy. "*Trust Regions for Explanations via Black-Box Probabilistic Certification*," International Conference on Machine Learning, (**ICML**), July 2024. [Paper] [Code]

[C1] **Swagatam Haldar**, Diptikalyan Saha, Dennis Wei, Rahul Nair, Elizabeth M. Daly. "*Interpretable Differencing of Machine Learning Models*," Conference on Uncertainty in Artificial Intelligence (**UAI**), August 2023. [Paper] [Code]

[B1] Diptikalyan Saha, Aniya Agarwal, Sandeep Hans, **Swagatam Haldar**. "*Testing, Debugging, and Repairing Individual Discrimination in Machine Learning Models*," Ethics in Artificial Intelligence: Bias, Fairness and Beyond, December 2023. [Chapter]

[A1] **Swagatam Haldar**, Deepak Vijaykeerthy, Diptikalyan Saha. "*Automated Testing of AI Models*," 2021. [arXiv]

US Patents Filed

[P6] Devika Sondhi, **Swagatam Haldar**, Diptikalyan Saha, Margaret Mary Dhanaswamy, Saritha Route, Aman Goyal, "*System and Method for Functional Test Case Generation for API Testing*," U.S. patent application no. 18/186878, March 2023.

[P5] Diptikalyan Saha, **Swagatam Haldar**, "*System and Method of Porting Explanations to Repair Explainability of a Model*," U.S. patent application no. 18/180185, March 2023.

[P4] Deepak Vijaykeerthy, Nishtha Madaan, **Swagatam Haldar**, Aniya Aggarwal, Diptikalyan Saha, "*System and Method for Selecting high likelihood failure samples*," U.S. patent application no. 18/074148, December 2022.

[P3] **Swagatam Haldar**, Diptikalyan Saha, Deepak Vijaykeerthy, Aniya Aggarwal, Nishtha Madaan, "*System and Method for testing Cascaded Speech-to-Text and Intent Classification Pipelines*," U.S. patent application no. 18/062857, December 2022.

[P2] **Swagatam Haldar**, Devika Sondhi, Diptikalyan Saha, "*System & Method for Learning String Program Surrogates Using Active Learning*," U.S. patent application no. 17/948625, September 2022.

[P1] Diptikalyan Saha, **Swagatam Haldar**, Swastik Haldar, "*System & Method for High-Precision Firewall Rules for Payload Diversion of Individual Discriminatory Samples*," U.S. patent application no. 17/509582, October 2021.

Scholastic Achievements

2024 *Wübben Stiftung Wissenschaft* Student Grant for academic performance in master's studies.

2020 Selected for a research internship at the University of Alberta under the UARE program.

2016 Mamraj Agarwal Rashtriya Puraskar, by Governor of West Bengal, India.

2016 Secured State Rank *1st* in Class 12 (Higher Secondary) Examination, West Bengal, India.

2014 Secured State Rank *9th* in Class 10 (Secondary) Examination, West Bengal, India.

Technical Skills

Languages `Python, C, C++, CUDA`

Libraries `Numpy, PyTorch, z3, cvxpy, Pyro, OpenCV, NetworkX, cuDNN`

Softwares `Git`, LaTeX, Linux/MacOS, MATLAB

Other Activities

- Teaching assistant for the Mathematics for ML lecture by Prof. Dr. Ulrike von Luxburg, Winter 24/25.
- Contributed to Stack Overflow community with $2600+$ reputation points, mostly before ChatGPT was a thing!
- Hobbies: Running, Bengali dramatics (at IIT Kharagpur), Learning magic tricks.