Bobby Huggins

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Washington University in St. Louis
St. Louis, MO

Objective Statement

I am a computer science PhD student researching probabilistic machine learning for science. I am excited about advancements in ML that promise to combine the "unreasonable effectiveness" of deep learning with desirable properties of probabilistic methods, like explainability and well-quantified uncertainty. I believe machine learning can and should be a force for good.

Education

Washington University in St. Louis, St. Louis, MO
PhD, Computer Science
    Advisor: Roman Garnett
AI-ACCESS NSF Fellow, studying probabilistic machine learning for science with an application focus on climate and environmental modeling.
    4.0/4.0 GPA

Aug. 2024 – current

University of Helsinki, Helsinki, FI
MS, Mathematics and Statistics
    Thesis Advisor: Samuli Siltanen
    Research Assistantship PI: Luigi Acerbi
Studied applied math with a specialization in probabilistic modeling.
    5.0/5.0 GPA

Sep. 2021 – June 2023

BA, Mathematics
The University of Chicago, Chicago, IL, USA
Additional elective coursework in physics, astronomy, and geophysical sciences.

Oct. 2010 – June 2019

Work Experience

Notable Systems, Denver, CO, USA
Software Engineer

Oct. 2023 – July 2024

- Researching, implementing, and training ML models for automated document processing, information extraction, and related uncertainty quantification;
- Deploying ML solutions at scale ($\approx$8,000 pages/hr);
- Fine-tuned a large language model (LayoutLM) on application-specific datasets to achieve classification on par with human accuracy.

Machine and Human Intelligence Lab, University of Helsinki, Helsinki, FI
Software Developer and Machine Learning Engineer

Jan. 2022 – Dec. 2022

- Worked as a core developer of *PyVBMC*, a Python package for sample-efficient Bayesian inference;
- Implemented existing algorithm and features, developed new features in consultation with PI;
- Followed best practices for software development, including comprehensive documentation, automated testing, and distribution on PyPI / `conda-forge`.
- Developed a Python package for validating and benchmarking algorithms for sample-efficient Bayesian inference, with embarrassingly parallel execution.

Academic Experiences

Awards and Honors

AI-ACCESS Fellow/NSF National Research Trainee (Award #2244165, Washington University in St. Louis)	*Ongoing*

Publications and Research Projects

C. Li, **B. Huggins**, P. Mikkola, and L. Acerbi [Normalizing Flow Regression for Bayesian Inference with Offline Likelihood Evaluations](#) *Advances in Approximate Bayesian Inference*	*April 2025*
B. Huggins, C. Li, M. Tobaben, M.J. Aarnos, and L. Acerbi [PyVBMC: Efficient Bayesian Inference in Python](#) *The Journal of Open Source Software*	*June 2023*
B. Huggins [A Bayesian Approach to Non-convex Asteroid Shape Determination](#) Master's Thesis, University of Helsinki	*June 2023*

Conferences and Presentations

The University of Chicago, Chicago, Illinois IMSI AI+Science Summer School Attendee, presented poster on PyVBMC.	*July 2023*
Aalto University, Helsinki, FI Finnish Centre for AI, R1 Research Group Annual Meeting Live demo of PyVBMC software and features.	*Apr. 2023*

Skills

- Wide mathematical background, with an emphasis on probabilistic modeling and machine learning for scientific applications.

- Experience with traditional machine learning and statistical techniques, as well as modern approaches to Bayesian inference and optimization, including variational inference, normalizing flows, Gaussian processes, and active learning.

- Proficient Python developer, with emphasis on statistical and scientific computing: Proficient with packages for numerics and data science.

- Familiar with best practices and procedures for modern software development: test-driven development, thorough documentation, code review, general programming paradigms and patterns, design and analysis of algorithms.

- Fluent in Python; Proficient in Julia and MATLAB; Some experience with Rust, Hasell, R, and C++.

- Proficient with general tools and procedures for software development: Linux CLI, `git`, GitHub automation and workflows, Docker, Python packaging.

- Proficient with general tools for technical writing and scientific communication: LaTeX, Jupyter Notebook.

- Strong communication and collaboration skills, written and spoken.

Relevant Graduate Coursework

Inverse Problems, Computational Statistics, Machine Learning, Bayesian Machine Learning, Advanced Bayesian Inference, Probabilistic Graphical Models, The Earth's Climate System, Advanced Algorithms, Continuous Mathematical Modeling, Mathematical Methods for Physics.