HAO WU

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EDUCATION

Northeastern University *Boston, MA*
Ph.D., Computer Science, GPA: 3.7/4.0 *2017 - Current*

University of Virginia *Charlottesville, VA*
M.Sc., Computer Science, GPA: 3.8/4.0 2015 - 2016

University of Washington *Seattle, WA*
M.Sc., Applied Mathematics, GPA: 3.7/4.0 *2014 - 2015*

Sichuan University *Chengdu, China*
B.Sc., Mathematics, GPA: 3.8/4.0 *2010 - 2014*

EXPERIENCE

Google Research *Cambridge, MA*
PhD Student Researcher *Oct 2022 - Dec 2022*
Research Intern *May 2022 - Sep 2022*

- Developed variational inference methods for learning multimodal dynamics from time series. Designed an end-to-end learning algorithm that is applicable to complex data modalities where inference is difficult.
- Implemented deep models in JAX and TensorFlow. Evaluated approach on learning hybrid representations of videos. Achieved interpretable representations that align closely with the physical dynamics in data.

IBM Research *Cambridge, MA*
Research Intern *Jun 2021 - Sep 2021*

- Developed contrastive learning methods to discover semantically meaningful features in noisy data.
- Implemented models in PyTorch. Learned disentangled representations of image data and healthcare data.

Oracle Labs *Burlington, MA*
Research Intern *Jun 2020 - Aug 2020*

- Developed novel energy-based models for unsupervised representation learning on large-scale image data.
- Evaluated methods on 4 image datasets using downstream tasks including logistic classification out-of-distribution detection, and kNN. Improved classification accuracy by **15%** on average against VAEs and GANs.
- Implemented deep models using PyTorch. Paper was accepted to **ICML 2021** with **a invited talk**.

Northeastern University *Boston, MA*
Research Assistant *Sep 2018 - Dec 2019*

- Developed a general variational inference framework that is scalable to high-dimensional structured data.
- Designed deep probabilistic models that can characterize prediction uncertainty based on various data inputs.
- Evaluated methods on 10k multi-object detection tasks and 20k clustering tasks. Achieved accurate results and scaled to 1k correlated latent variables while VAEs + MCMC baselines completed failed.
- Implemented the framework in Pytorch and ProbTorch. Paper was accepted to **ICML 2020**.

MicroStrategy *Tysons, VA*
Software Engineer *Jan 2017 - May 2017*

- Developed statistical models for analyzing user activities as new features. Implemented custom visualization tools that support various uses cases in Business Intelligence. Deployed these tools in the integrated Platform.

SKILLS

Machine Learning: Deep Generative Models, Variational Inference, Representation Learning

Programming: Python(Pytorch, TensorFlow), Java, R, MATLAB **Systems:** Linux, Windows

PUBLICATIONS

Nested Variational Inference **NeurIPS**, *2021*
H Zimmermann, **H Wu**, B Esmaeili, S Stites, JW van de Meent

Learning Proposals for Probabilistic Programs with Inference Combinators **AISTATS**, *2021*
S Stites*, H Zimmermann*, **H Wu**, E Sennesh, JW van de Meent

Conjugate Energy-Based Models **ICML**, *2021*
H Wu*, B Esmaeili*, M Wick, JB Tristan, JW van de Meent

Amortized Population Gibbs Samplers with Neural Sufficient Statistics **ICML**, *2020*
H Wu, H Zimmermann, E Sennesh, TA Le, JW van de Meent

Structured Disentangled Representations **AISTATS**, *2019*
B Esmaeili, **H Wu**, S Jain, A Bozkurt, N. Siddharth, B Paige, DH Brooks, J Dy, JW van de Meent

TALKS

Contributed talk at ICLR Energy-Based Models Workshop *2021*
Contributed talk at Symposium on Advances in Approximate Bayesian Inference *2021*

SERVICES

Reviewer: ICML 2021 2023, ProbProg 2021, AISTATS 2022 2023, NeurIPS 2022