James Bowden

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EDUCATION

California Institute of Technology　　　　**2019 – Jun 2023**
B.S. Computer Science, Data Science Minor　　　　GPA 4.0

EXPERIENCE

Ryan Adams Group (LIPS), Princeton | Jun. 2022 – Present
- Reframing topology optimization of mechanical structures with implicit surfaces to be able to specify functional priors
- Creating end-to-end differentiable pipeline for rational design of 2/3-D materials given arbitrary mechanical objectives, e.g., precise multi-stability in metamaterials

Katie Bouman Group, Caltech | Jan. 2022 – Present
- Building from CycleGAN to exaggerate decision features in images for model explainability, domain prior consistency

Anima Anandkumar Group, Caltech | Jan. – Mar. 2022
- Efficiently trained diffusion models by partitioning ~200K-D data in Fourier domain, hierarchically conditioning signals
- Cut sampling time from ~14hrs to ~2hrs in prelim. tests

Yisong Yue Group, Caltech | Jun. 2020 – Present
- Integrated Deep Kernel Learning (DKL) with BayesOpt (BO) to find global optima faster on complex, high-dim datasets
- Created "fully-Bayesian" active learning pipeline with posterior sampling (Thompson sampling, MC dropout)
- Helped develop algo. to adaptively filter candidate data
- Developing (multi-fidelity) DK-BO for rational design, incl. COVID protein engineering and nanophotonics filter design

Software Engineering Intern, Uber | Jun. – Sept. 2021
- Designed conditional models to increase driver offer acceptance, trip completion rates
- Pioneered geo-time embedding for country-wide model with cold-start prediction capabilities for transfer learning

Head Teaching Assistant, Caltech | Sept. 2020 – Present
- Hold office hours, write assignments, give code reviews, lead lab, grade code, instill good development practices. As Head TA for CS 2, hire/train/support/manage 18 other TAs.
  CS 156ab: **Machine Learning** [FA 21/22 SP 22/23] • CS 24: **Computing Systems** [FA 21] • CS 3: **Software Design** [SP 21] • CS 2: **Data Structures/Algorithms** [WI 21/22/23] • CS 1: **Intro CS** [FA 20]

PUBLICATIONS

Learning Region of Interest for Bayesian Optimization with Adaptive Level-Set Estimation. ICML 2022. realworldml.github.io/files/cr/paper63.pdf

Deep Kernel Bayesian Optimization. Pre-print 2021.
www.osti.gov/biblio/1811769-deep-kernel-bayesian-optimization

SKILLS

Languages
Python, C, Java, R, MATLAB

Tools
PyTorch, Keras, JAX, pandas

Techniques
Deep Learning, Gaussian Process, BayesOpt, Auto-diff

COURSEWORK

- ML & Data Mining
- Machine Learning Systems
- Variational Inference
- Uncertainty Quantification
- Representation Learning
- NN Theory and Control
- Statistical Inference
- Bayesian Statistics
- Probability Models
- Markov Chains, Discrete Stochastic Processes
- Applied Linear Algebra
- Algorithms
- Data Structures
- Software Design
- Computing Systems

AWARDS

Rypisi SURF Fellow, 2022
For outstanding research

Associates SURF Fellow, 2020
For outstanding research

Teaching Mode, 2018
Best research presentation

Eagle Scout, 2018

ACTIVITIES

Caltech CMS DEI Committee

President, Caltech Student Investment Fund
$1M AUM, STEM sector focus

Ambassador, Caltech SURF
Advise research fellows