James Bowden

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EDUCATION

California Institute of Technology **GPA 4.1/4.0**
B.S. Computer Science, Data Science Minor Grad: 2023

WORK EXPERIENCE

Machine Learning Researcher, SURF Intern | Jun. 2020 - Present
Yisong Yue Group, Caltech

- Integrated deep kernel learning (DKL) with Bayesian optimization (BO) using PyTorch to improve model fit, find global optima faster
- Supplemented with Thompson sampling, Monte Carlo dropout, deep ensembles, dynamic architectures and acquisition parameters
- Cut regret by over 50% with DKL-BO compared to best GP models
- Develop multi-fidelity DKL-BO for real-world problems like COVID-19 protein engineering and nanophotonics filter design

Undergraduate Bioinformatics Researcher | Dec. 2019 – Present
Kaihang Wang Lab, Caltech

- Undergraduate bioinformatics lead in research group
- Produced tools to predict set of minimum essential genes, assemble nanopore reads, recode genes using Pandas, NumPy
- Pioneer graph theory approach to model gene dependencies
- Inform wet bench projects like genome minimization and recoding

PROJECT EXPERIENCE

Ancestral Genome Reconstruction, Wang Lab | Mar. 2020 - Present

- Lead team of 3 Caltech juniors to create automated pipeline:
  - Collapse large amounts of sequence data to gene ordering data
  - Analyze ordering differences to predict consensus ordering
  - Reconstruct consensus genome and perform viability checks
- Researched and integrated existing cmd line tools into pipeline
- Build server to host as web tool for use by scientific community

Alien Escape Game, Caltech | Mar. - Jun. 2020

- Created escape game from scratch using C with team of 3 students
- Implemented A* pathfinding, physics engine, vision, map, graphics
- Significantly reduced lag via dynamic programming

TEACHING EXPERIENCE

Teaching Assistant, Caltech | Sept. 2020 - Present

- CS 2 (Data Structures & Algorithms, Java): hold office hours, lead lab section, help optimize online learning, create web scraping workshop
- CS 1 (Intro Programming, Python): hold office hours, grade code

Investing Principles Crash Course, Wave LF | Jun. - Aug. 2020

- Created curriculum and co-taught basics of investing, stock market, indicators, options to over 1100 middle and high school students

SKILLS

Languages
Python, C, Java, JavaScript, MATLAB, HTML, Latex

Tools
PyTorch, sklearn, Pandas, NumPy, matplotlib

Techniques
Bayesian Optimization, Deep Learning, SVM, Web Scraping

COURSEWORK

- Machine Learning & Data Mining
- (Machine) Learning Systems
- Computing Systems
- Data Structures & Algorithms
- Software Design
- Asynchronous Programming
- Applied Linear Algebra
- Probability & Statistics

AWARDS

Thermo-Fisher Sch., 2019
One of six recipients of scholarship for biomedical research experience

Teaching Mode, 2018
Best summer research presentation in cohort of 30

Eagle Scout, 2018

ACTIVITIES

Treasurer, Caltech Student Investment Fund
$1M AUM, focused on STEM sectors

Ambassador, Caltech SURF
Advise and support cohort of summer research interns

Frosh Camp Counselor
Orient and support new frosh

Caltech Cannon Master
Fire and maintain 1.3-ton, 130-year-old cannon

Caltech Water Polo Team