James Bowden

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EDUCATION

California Institute of Technology **GPA 4.2**
B.S. Computer Science, Data Science Grad: 2023

WORK EXPERIENCE

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

- Implemented deep kernel learning (DKL) in PyTorch by overlaying DNN with GP and training hyperparameters together for improved fit
- Reduced neural net overfitting and fixed numerical issues necessary for practical application in adaptive experiment design setting
- Integrate DKL into single- and multi-fidelity Bayesian Optimization frameworks to increase fit accuracy and find global optima quickly
- Invited to stay on for academic year to work on 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
  - Calculate consensus sequences, reconstruct genome, and check viability (e.g. search for essential substrings and patterns)
- Researched and integrated existing command 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 w/ elastic collisions and forces, geometric vision, map, SDL graphics
- Significantly reduced lag via dynamic programming

Social Media App | Jun. 2020 - Present

- Develop original social media application with React.js

TEACHING EXPERIENCE

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, Pandas, NumPy, matplotlib, React.js

Techniques
Bayesian Optimization, Deep Learning, Web Scraping

COURSEWORK

- Data Structures and Algorithms
- Software Design
- Asynchronous Programming
- Decidability and Tractability
- Data Processing and Analysis for Biology
- Computing Systems
- Learning Systems

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
Manage $1M stock portfolio 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