Matthew Bowers

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Education

Massachusetts Institute of Technology (Cambridge, MA)
PhD in EECS 2020 – Present
Advisors: Armando Solar-Lezama and Joshua B. Tenenbaum

Columbia University (New York, NY)
B.A. in Computer Science & B.A. in Chemistry 2016 – 2020
Summa cum Laude, Phi Beta Kappa (Junior), GPA: 4.08 (CS: 4.22, Chem: 4.17), Dean's List

Research Interests

My research interests center on *program synthesis* and *artificial intelligence*. I'm particularly interested in *neurosymbolic methods* that bridge the machine learning and programming languages communities. I believe symbolic methods can augment neural methods to facilitate low-data learning, generalization, transfer learning, interpretability, and other desiderata.

Additional Research Experience

Microsoft Research
Research Intern (Cambridge, MA) Summer 2021
Advisor: Adam Tauman Kalai
Topic: Large language models for program synthesis

Massachusetts Institute of Technology, Learning Matter Group
Research Assistant 2019 – 2020
Advisor: Rafael Gomez-Bombarelli
Topic: Graph-based deep learning for chemical simulations

Columbia University, Theoretical Chemistry Group
Computational Research Assistant 2017 – 2020
Advisor: Angelo Cacciuto
Topic: CUDA-accelerated chemical simulation

Columbia University, Materials & Spectroscopy Group
Research Assistant Summer 2017
Advisors: Jonathan Owen & Andrew Crowther
Topic: Computational analysis of spectroscopic properties of quantum nanoplatelets for solar cells

Awards

NSF Graduate Research Fellowship (2022)

Summa cum Laude (2020), Columbia University

Computer Science Scholarship Award (2020), Columbia University – for academic merit (2 given)

Richard Bersohn Prize (2020), Columbia University – for academics and research in chemistry (1 given)

Junior Phi Beta Kappa (2019), Columbia University – awarded to top 2% of undergraduates

Class of 1939 Fellowship (2019), Columbia University

Columbia College Summer Funding Program Fellowship (2019), Columbia University

Guthikonda Fellowship (2018), Columbia University

Science Research Fellowship (2016), Columbia University – multi-year research funding

Publications

Language Models Can Teach Themselves to Program Better (Submitted to ICLR 2023*).*
Patrick Haluptzok, Matthew Bowers, Adam Tauman Kalai.

LILO: Library Induction With Large Language Model Outputs (*In Prep).*
Gabriel Grand, Catherine Wong, Matthew Bowers, Theo Olausson, Joshua B Tenenbaum, Armando Solar-Lezama, Jacob Andreas.

Stitch: Top-Down Synthesis For Library Learning (*POPL 2023).*
Matthew Bowers, Theo Olausson, Catherine Wong, Gabriel Grand, Kevin Ellis, Joshua B Tenenbaum, and Armando Solar-Lezama.

Generating Programming Puzzles to Train Language Models (*Deep Learning for Code Workshop @ ICLR 2022).*
Patrick Haluptzok, Matthew Bowers, Adam Tauman Kalai.

Representing Partial Programs With Blended Abstract Semantics (*ICLR 2021).*
Maxwell Nye, Yewen Pu, Matthew Bowers, Jacob Andreas, Joshua B. Tenenbaum, Armando Solar-Lezama.

Universal Reshaping of Arrested Colloidal Gels via Active Doping (*Journal of Chemical Physics 2020).*
Stewart Mallory, Matthew Bowers, Angelo Cacciuto.

Active Sculpting of Colloidal Crystals (*The Journal of Chemical Physics 2019).*
Shibananda Das, Matthew Bowers, Clara Bakker, Angelo Cacciuto.

Predicting Scalar Coupling Constants Through Deep Learning (*Columbia Undergraduate Research Symposium 2019).*
Matthew Bowers, Wujie Wang, Rafael Gomez-Bombarelli.

Teaching

Teaching Assistant in Discrete Mathematics (2019), Columbia University

Teaching Assistant in Calculus III (2018), Columbia University

Tutor in Chemistry Help Room (2018-2019), Columbia University

Service & Community

Co-Chair of Student Volunteering @ PLDI 2021 & PLDI 2022

MIT EECS Grad Student Association, VP of Diversity Equity & Inclusion (2022)

MIT EECS THRIVE, Diversity Equity & Inclusion Event Organizer (2021-2022)

MIT CSAIL, Post Doc and Grad Student Council (2021-2022)