Avi Schwarzschild

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EDUCATION

University of Maryland — **Maryland, USA**
PhD in Applied Mathematics and Scientific Computation — Expected May 2023

University of Washington — **Washington, USA**
Master of Science in Applied Mathematics — June 2018

Columbia University, School of Engineering and Applied Science — **New York, USA**
Bachelor of Science in Applied Mathematics — May 2017

RESEARCH EXPERIENCE

University of Maryland — **Maryland, USA**
Research Assistant, Under Dr. Tom Goldstein — Spring 2019 - Present

- Attempting to further our understanding of why/when neural networks can learn and generalize.
- Studying logical extrapolation and model vulnerability.
- Designing and executing experiments in Python using PyTorch.

University of Washington — **Washington, USA**
Research Assistant, Under Dr. Randy LeVeque — Fall 2017 - Summer 2018

- Developed timing tests for multilayer tsunami models.
- Improved visualization for tsunami models and for run-time data.

Columbia University — **New York, USA**
Research Assistant, Under Dr. Kyle Mandli — Summer 2015 - Fall 2017

- Contributed to research in adaptive mesh refinement (AMR) used for modeling geophysical fluid dynamics.
- Developed tsunami modeling programs utilizing AMR in Python and Fortran (github.com/aks2203/geoclaw).

WORK AND TEACHING EXPERIENCE

Arthur — **New York, USA**
Research Fellow — Summer 2022 - Present

- Investigating the consistency of post-hoc XAI feature attribution tools.
- Designing and conducting experiments for conference style publication.
- Consulting with the ML team on various fairness and explainability projects.

Math Tutor — **Maryland & New York**
College, High School, and Elementary School Math Tutor — Fall 2013 - Present

- Instruct several students in algebra, geometry, trigonometry, calculus, and differential equations.
- Provide help with weekly assignments and preparation for exams.

University of Maryland — **Maryland, USA**
Assistant Teacher — Fall 2018 - Fall 2021

- Taught undergraduate courses including Calculus and Intro to Matlab.

University of Washington — **Washington, USA**
Assistant Teacher — Fall 2017 - Spring 2018

- Taught weekly sections and held weekly office hours for introduction course in scientific computing.

Columbia University — **New York, USA**
Assistant Teacher, Department of Mathematics — Fall 2015, Fall 2016, Spring 2017

- Taught material from calculus, differential equations, and complex analysis courses.

TECHNICAL STRENGTHS & INTERESTS

Computing: Proficient in Python (relevant packages include PyTorch and NumPy), Matlab, and LaTeX. Familiar with Fortran and C/C++. github.com/aks2203

Hobbies: Woodworking, photography, cooking, hockey

Publications

1. Arpit Bansal, Avi Schwarzschild, Eitan Borgnia, Zeyad Emam, Furong Huang, Micah Goldblum, and Tom Goldstein. End-to-end algorithm synthesis with recurrent networks: Logical extrapolation without overthinking. In *NeurIPS*, 2022
2. Avi Schwarzschild, Arjun Gupta, Amin Ghiasi, Micah Goldblum, and Tom Goldstein. The uncanny similarity of recurrence and depth. In *International Conference on Learning Representations (ICLR)*, 2022
3. Micah Goldblum, Dimitris Tsipras, Chulin Xie, Xinyun Chen, Avi Schwarzschild, Dawn Song, Aleksander Madry, Bo Li, and Tom Goldstein. Dataset security for machine learning: Data poisoning, backdoor attacks, and defenses. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2022
4. Avi Schwarzschild, Eitan Borgnia, Arjun Gupta, Furong Huang, Uzi Vishkin, Micah Goldblum, and Tom Goldstein. Can you learn an algorithm? generalizing from easy to hard problems with recurrent networks. In *NeurIPS*, 2021
5. Micah Goldblum, Avi Schwarzschild, Ankit B Patel, and Tom Goldstein. Adversarial attacks on machine learning systems for high-frequency trading. In *ACM International Conference on AI in Finance (ICAIF)*, 2021
6. Avi Schwarzschild, Micah Goldblum, Arjun Gupta, John P Dickerson, and Tom Goldstein. Just how toxic is data poisoning? a unified benchmark for backdoor and data poisoning attacks. In *International Conference on Machine Learning (ICML)*, pages 9389–9398. PMLR, 2021
7. Ahmed Abdelkader, Michael J Curry, Liam Fowl, Tom Goldstein, Avi Schwarzschild, Manli Shu, Christoph Studer, and Chen Zhu. Headless horseman: Adversarial attacks on transfer learning models. In *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 3087–3091. IEEE, 2020
8. Micah Goldblum, Jonas Geiping, Avi Schwarzschild, Michael Moeller, and Tom Goldstein. Truth or backpropaganda? an empirical investigation of deep learning theory. In *International Conference on Learning Representations (ICLR)*, 2019

Preprints

1. Avi Schwarzschild, Alex Stein, Michael Curry, Tom Goldstein, and John P Dickerson. Protecting bidder information in neural auctions, 2022
2. Roman Levin, Valeriia Cherepanova, Avi Schwarzschild, Arpit Bansal, C Bayan Bruss, Tom Goldstein, Andrew Gordon Wilson, and Micah Goldblum. Transfer learning with deep tabular models. *arXiv preprint arXiv:2206.15306*, 2022
3. Gowthami Somepalli, Micah Goldblum, Avi Schwarzschild, C Bayan Bruss, and Tom Goldstein. Saint: Improved neural networks for tabular data via row attention and contrastive pre-training. *arXiv preprint arXiv:2106.01342*, 2021
4. Arpit Bansal, Micah Goldblum, Valeriia Cherepanova, Avi Schwarzschild, C Bayan Bruss, and Tom Goldstein. Metabalance: High-performance neural networks for class-imbalanced data. *arXiv preprint arXiv:2106.09643*, 2021
5. Avi Schwarzschild, Eitan Borgnia, Arjun Gupta, Arpit Bansal, Zeyad Emam, Furong Huang, Micah Goldblum, and Tom Goldstein. Datasets for studying generalization from easy to hard examples. *arXiv preprint arXiv:2108.06011*, 2021
6. Avi Schwarzschild and Kyle T Mandli. An implementation of adaptive mesh refinement for shallow water equations. *arXiv preprint arXiv:1803.01450*, 2018