Alex Stein

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RESEARCH OVERVIEW

My research interests cover a range of machine learning topics, including but not limited to: LLM reasoning, adversarial attacks, efficient inference using adaptive compute. I am especially interested in exploring the extent to which LLMs understand context and generalize beyond their training data.

EDUCATION

PhD Candidate in Computer Science — **College Park, MD**
University of Maryland — August 2021 - Present
· Advised by Prof. Tom Goldstein and Prof. John Dickerson

Masters of Science, Computer Science — **College Park, MD**
University of Maryland — Dec 2024
· GPA: 3.8

Columbia University — **New York City, NY**
BS Computer Science: Machine Learning Concentration — May 2016
· Minor: Operations Research

EMPLOYMENT EXPERIENCE

Capital One — **McLean, VA**
Applied Research PhD Intern, Behavioral Modeling Team — June 2024-Aug 2024
· Applied Researcher focused on transformers for temporal tabular data tasks such as event prediction and time series

University of Maryland — **College Park, MD**
Research Assistant — May 2022-Present
· Research assistant in Tom Goldstein's lab exploring the ways in which language models reason in long context settings and other length-generalization tasks

RBC Capital Markets — **New York City, NY**
VP, Quantitative Researcher and Development, Global Equities — Aug 2016-Dec 2021
· Created alpha signals used to predict market direction
· Trained predictive models used in production systems for scheduling, liquidity seeking, and routing algorithms
· Co-lead rewrite of entire trading system, personally contributing over 10,000 lines of code

TEACHING EXPERIENCE

University of Maryland — **College Park, MD**
Teacher's Assistant
· Analysis of Algorithms (Fall 2021)
· Introduction to Machine Learning (Spring 2022)

TECHNICAL SKILLS, CERTIFICATES AND AWARDS

Computer Languages	Python, Java, Matlab, LaTeX, Q/kDB+
ML Frameworks	Pytorch, Huggingface, Lightning, Pandas, Numpy
Github	https://github.com/alexstein0
Dean and Chair Fellowship	Aug 2021–May 2023
FINRA qualifications exams	Series 7, 57, 63

TALKS

Featurespace research seminar: Event Prediction using Autoregressive Transformers — **Jan 2025**
UMD ML research group: Intro to Event Prediction using Transformers — **Nov 2024**
Capital One AI research symposium: Event Prediction with Autoregressive Transformers — **Aug 2024**
Capital One Behavioral Modeling research group: Event Prediction — **July 2024**

PAPERS AND PREPRINTS

A Simple Baseline for Predicting Events with Auto-Regressive Tabular Transformers
Alex Stein, Samuel Sharpe, Doron Bergman, Senthil Kumar, C. Bayan Bruss, John Dickerson, Tom Goldstein, and Micah Goldblum
arXiv preprint arXiv:2410.10648

Coercing LLMs to do and reveal (almost) anything
Jonas Geiping**, Alex Stein**, Manli Shu, Khalid Saifullah, Yuxin Wen, and Tom Goldstein
arXiv preprint arXiv:2402.14020

Transformers Can Do Arithmetic with the Right Embeddings
Sean McLeish, Arpit Bansal**, Alex Stein**, Neel Jain, John Kirchenbauer, Brian R. Bartoldson, Bhavya Kailkhura, Abhinav Bhatele, Jonas Geiping, Avi Schwarzschild, and Tom Goldstein
The Thirty-eighth Annual Conference on Neural Information Processing Systems

Running Huge Context Windows On Tiny GPUs
Monte Hoover, Ryan Synk, Neel Jain, John Kirchenbauer**, Alex Stein**, Manli Shu, Ramani Duraiswami, and Tom Goldstein
Under Review, arXiv pending. Under Review

Algorithm Design for Learned Algorithms
Avi Schwarzschild, Sean Michael McLeish, Arpit Bansal, Gabriel Diaz**, Alex Stein**, Aakash Chandnani, Aniruddha Saha, Richard Baraniuk, Long Tran-Thanh, Jonas Geiping, and Tom Goldstein
arXiv pending

What Algorithms do Machines Learn to Solve Mazes?
Avi Schwarzschild, Arpit Bansal, Sean McLeish**, Alex Stein**, and Tom Goldstein
arXiv pending

Neural Auctions Compromise Bidder Information
Alex Stein, Avi Schwarzschild, Michael Curry, Tom Goldstein, and John Dickerson
arXiv preprint arXiv:2303.00116

Deadpool: a Deeper, Darker, Dark Pool from Horizontally Scalable Parallel MPC for databases
Alex Stein, Kamil Doruk Gur, and Ian Miers
arXiv pending

EDM: Extracted Descriptions of Music from Generative Models
Gowthami Somepalli, Khalid Saifullah, Hamid Kazemi**, Alex Stein**, Arpit Bansal, David Miller, Micah Goldblum, and Tom Goldstein
arXiv pending