Roy Rinberg

www.royrinberg.com
royrinberg+CV@gmail.com

Education

Columbia University, New York, NY 2021 - Present
M.S. Computer Science; Thesis Track: Advised by Prof. Rachel Cummings and Prof. Steven Bellovin

New York University, New York, NY 2014 - 2018
B.A. Computer Science, Physics, Minor: Math.

Thomas Jefferson High School for Science and Technology, Alexandria, VA 2010 - 2014

Selected CS Coursework: Neural Networks, ML, Computational Learning Theory, Foundations of Blockchain, Security, Theory of Computation, Operating Systems, Computer Systems Organization
Selected Math Coursework: Honors Algebra, Analysis, Probability, Linear Algebra, Statistics

Software Skills

Software and Programming Languages: Python, C, C++, Go, Linux, Pytorch, Tensorflow, Docker, AWS, Google Cloud Services, ROS, ELK Stack, Pandas, Jenkins, Artifactory, SQL, Web-scraping, Opacus, Jax

Research Experience

Columbia University, New York, NY August 2021 - Present
Privacy in ML **[Advisors: Prof. Rachel Cummings and Prof. Steven Bellovin]**

- Research on relaxations to the distributional and trust assumptions in centralized and decentralized private learning.
- Research on how ML algorithms memorize training data, and the trade-offs of memorization, Differential Privacy (DP), and accuracy.
- Extensions of Gaussian & Laplace DP primitives, and their application to ML.

University of Toronto, Toronto, Ontario May 2022 - September 2022
Privacy in Machine Learning **[Advisor: Prof. Nicolas Papernot]**

- Research on Individualization of PATE. Paper accepted to PoPETs 2023. Arxiv link.
- Research on Individualization of DP-SGD. *On-going.*
- Research on Catered PATE - PATE in the presence of heterogenous data (link). *On-going.*

New York University, New York, NY February 2017 - May 2018
Evolution of Language Models within Social Networks **[Advisor: Prof. Bud Mishra]**
This research investigated the development of echo chambers within social networks.

- Developed pipeline to study the evolution of clusters of users in social networks over time, using topological data analysis to study distances between Word2Vec models trained on text.
- Scraped Reddit to supplement a dataset of Reddit text from multiple years (∼1TB).
- Helped with mathematical proofs and ran simulations. Publication on arXiv.

Work Experience

Shelton AI, New York, NY January 2022 - June 2022
Lead Software Engineer
Shelton AI is a startup that helps pension funds manage investments in private equity firms.

- Worked with CEO to develop fintech product to manage 10s of millions of dollars.
- Developed core AWS infrastructure for NLP document processing pipeline.

Ouster, San Francisco, CA June 2018 - July 2021
Software Engineer
Ouster is a startup developing lidar sensors. I worked on lidar-based collision-avoidance systems

- Led development of on-edge computing for live predictions about dangerous driving.
- Developed platforms for evaluating algorithms on historical lidar data and monitoring live data.
- *Internship Project:* Produced open-source C++ lidar point-cloud data visualizer (Github link).

Career Copilots, San Francisco CA May 2020 - August 2020
Software Engineer
Career Copilots is a startup seeking to help individuals find jobs using data.

- Developed python web-scraper to scrape jobs-data to help users find roles catered to them.
- Developed pandas data-exploration pipeline for investigating LinkedIn user data.

Internships

Knight First Amendment Institute, NYC September 2022 - Present
Algorithmic Amplification in Society [Advisor: Professor Arvind Narayaran]
KFAI works to protect digital freedoms through strategic litigation, research, and education.

- Work with Professor Arvind Narayaran to develop essays, videos, and interactives for explaining how algorithmic amplification can affect speech online.

Hong Kong University for Science and Technology, Hong Kong Summer 2016
Research in Industrial Projects for Students (RIPS-HK) [Advisor: Dr. Avery Ching]
RIPS-HK is an REU with HKUST and an industrial sponsor.

- Developed protocol for robust, acoustic communication by underwater drones in noisy channels.
- Team lead for team of 3 other students.

Janelia Research Campus, HHMI, Ashburn, VA Summer 2015
Scientific Computing Group [Advisors: Dr. Khaled Khairy and Dr. Sean Murphy]
Janelia Research Campus is a neuroscience and imaging research center.

- Decreased stitching time from 13.7 sec/image-pair to 1.8 sec/image-pair, using OpenCV and OpenMP on GPU cluster, on the Stitching Multi-Terrabyte ssTEM Image Data project.

Weizmann Institute of Science, Rehovot, Israel Summer 2014
International Summer Science Institute (ISSI) [Advisor: Prof. Roee Ozeri]
ISSI is an international internship for natural sciences and math. I worked in the Trapped Ions Lab.

- Developed data visualization to study ultra-cold atoms in a laser-cooled Magneto-Optical Trap.

Papers

1. F. Boenisch, C Mühl, **R. Rinberg**, J. Ihrig, A. Dziedzic. Individualized PATE: Differentially Private Machine Learning with Individual Privacy Guarantees. Accepted to PoPETs 2023.
2. A. Tamaskar, **R. Rinberg**, S. Chakraborty, B. Mishra. *Creolizing the Web.* arXiv:2102.12382 .

Pre-Prints

1. **R. Rinberg** and A. Nichani. *Improvements and Analysis of Private Ensemble-Based Federated Learning.* Pre-Print. 2021.
2. **R. Rinberg**, N. Agarwal. *Privacy when Everyone is Watching: An SOK on Anonymity on the Blockchain.* ePrint.

Articles

1. **R. Rinberg**. *Resources for Public-Interest Technology.* Medium (self-published). 2020.
   Comprehensive list of resources for working in Public-Interest Technology. Link.
2. **R. Rinberg**. *Jell-O Brains and DNA: High School Students Launch Innovative STEM Program.* Scientific American. 2014.
   Invited article in 'Budding Scientist' series describing work leading Project BEST. Link.

Teaching

NYU - General Physics I and II Tutor September 2017 - May 2018

- Tutored physics courses on classical mechanics and electricity & magnetism.

Awards, Memberships, Conferences

Columbia Advanced Master's Research Specialization	2022-2023
Workshop on DP and Statistical Data Analysis (Toronto, ON)	Summer 2022
Differential Privacy Summer School (Boston, MA)	Summer 2022
Presidential Honors Scholar (NYU)	2015 - 2018
Dean's List (NYU)	2014 - 2018
Sigma Pi Sigma (Physics Honor Society) (NYU)	Inducted 2018
HPC for Undergraduates - Conference Scholarship for SC'17	Fall 2017
DURF & Research+ for Housing and Stipend (NYU)	Summer 2017

Leadership

Project BEST (Building Excitement for Science and Technology) 2011 - 2014
CFO and Co-founder
Project BEST is a non-profit which develops after-school STEM programs for middle school students.

- Fundraised and grew organization to 25 chapters across 3 states, reaching 3000+ students.
- Led two full-day STEM programs for 100+ students, and co-led team of 20 volunteers.

Side-Projects and Service

Ouster Community Work 2018-2020

- Advocated management to institute paid volunteer-day and donate $6k to 6 public-interest orgs.