ETHAN TUROK

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EDUCATION

Columbia University, *School of Engineering and Applied Sciences* — New York, NY

Bachelor of Science Candidate in Computer Science, Applied Mathematics | **GPA:** 3.95 — Expected May 2023

Relevant Coursework: Data Structures, Linear Algebra, Probability, Discrete Math, Optimization, Artificial Intelligence, Natural Language Processing, Numerical Methods, Linear Regression, Machine Learning, Analysis of Algorithms

The University of Chicago — Chicago, IL

Bachelor of Science Candidate in Physics | **GPA**: 3.85 — October 2019 - June 2020

Relevant Coursework: Calculus I-IV, Honors Physics

EXPERIENCE

Columbia University Department of Computer Science — New York, NY

Machine Learning Researcher under Rachel Cummings (Columbia) — September 2021 - Present

- Develop DP-SMOTE, an algorithm to generate synthetic data points in a differentially private (DP) way
- The algorithm uses: uniform hypersphere sampling (computational thermodynamics), k-nearest neighbors (machine learning), disjoint subsets of r-nearest neighbors graphs (graph theory), the exponential mechanism (DP)
- Implement DP-SMOTE in python and design numerical experiments to benchmark performance
- Prove a tighter upper bound on the privacy of DP-SMOTE via the Parallel Composition Theorem of DP

Columbia University Department of Industrial Engineering and Operations Research — New York, NY

Machine Learning Researcher under Kaizheng Wang (Columbia) — May 2021 - August 2021

- Implemented Clustering via Uncoupled REgression (CURE) from NIPS 2020 paper with vectorized python code
- Demonstrated that CURE 1) outperforms traditional algorithms on classifying elliptically distributed data and 2) performs poorly on data with a non-linear decision boundary, confirming the theoretical results of the paper
- Self-studied Boyd's *Convex Optimization* and Hastie's *Elements of Statistical Learning* to understand the paper
- Implemented machine learning algorithms from scratch in numpy: K-Means, Feed Forward NN, EM, SGD, etc.

StudBud — New York, NY

Co-founder — June 2020 - June 2021

- Co-founded StudBud, a social platform that matches students into ideal study groups with a machine learning algorithm during Covid-19, specifically, an agglomerative hierarchical clustering algorithm
- Fall 2020: StudBud had 1300+ sign-ups at Columbia University
- StudBud was featured in the school paper and won the Columbia Innovation and Enhancement Award

Columbia University, Hebrew University Department of Computer Science — New York, NY

Natural Language Processing Researcher under Daniel Bauer, Sarah Cohen — October 2020 - January 2021

- Studied the question: if a piece of writing contains multiple dates, which date is the most important to the article?
- Developed Naive Bayes classifier to predict the most important date in a Wikipedia article with accuracy of 71% and an F1-Score of 0.83. Independently generated and cleaned my own dataset

University of Chicago Rust Lab — Chicago, IL

Research Assistant — June 2020 - September 2020

- Modeled biological oscillators with differential equations and discrete stochastic models in Python
- Researched period-amplitude uncoupling in Elowitz's Repressilator model

Ropes Course Operator, *Camp Stone,* Summer 2017, 2019

- Belayed campers, taught climbing and safety spotting techniques for 300+ campers each week
- Operated ropes course, rock wall, zipline, and low rope elements

EXTRACURRICULAR ACTIVITIES

Emerging Scholars Program, *Workshop Assistant* January 2021 - Present

- Teach weekly class to 10+ freshmen on advanced computer science topics: machine learning, graph theory, UI/UX, algorithms, cryptography, etc.
- Awarded Columbia Community Building Award for excellence in teaching and fostering a sense of community

Columbia Climbing Team, *Member* January 2021 - Present

- Participate in practices and local/national competitions

Columbia Data Product Initiative, *Data Scientist* September 2020 - May 2021

- Develop application that converts raw piano audio into sheet music via a deep learning model
- Implement automatic music recognition research paper; study audio signal processing: Constant-Q Transform, spectrograms, MFCCs, etc.

Masa, *Campus Ambassador* September 2019 - October 2020

- Coordinate and develop Israel programming for UChicago/Columbia students and community

UChicago Society for Physics Students, *Member* September 2019 - June 2020

- Weekly physics lectures, trips to national labs, receive mentorship from physics majors

URock, *Member* September 2020 - June 2020

- Participate in local and national competitions with UChicago's Rock Climbing Team

SAR High School Rock Climbing Club, *Co-Founder* September 2015 - June 2018

- Organized biweekly meets and provided technical climbing instruction to 22 club members

HONORS, AWARDS, AND FELLOWSHIPS

Dean's List	All Semesters
Columbia Institute for Israel and Jewish Studies Undergraduate Israel Fellowship	2022
Columbia Community Building Award	2022
Qualified for ACM-ICPC Greater New York North America Regionals (coding competition)	2022
Nachshon Project Fellow	2021
Columbia Innovation and Enhancement Award	2021
Emerging Scholars Program	2020
Rimon Fellow	2020

PROJECTS

- Implement multilayer perceptron model
- Implement minimax algorithm to beat Connect-4 players

SKILLS

Programming Languages	Python, Java, C, LaTeX, Bash
Technologies/Packages	Git; Numpy, Scikit-Learn, Scipy, Pandas, PyTorch, Spacy
Languages	English (native), Hebrew (professional fluency)
Interests	Classical guitar, creative writing, snowboarding, and rock climbing