Karan Vombatkere

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Education

Boston University — Boston, MA
Ph.D. Computer Science — *Aug 2021 - present*
- *Algorithmic Data Mining, Computational Social Science* [GPA: 3.86]

University of Rochester — Rochester, NY
M.S. Data Science — *May 2018*
- *Computational & Statistical Methods* [GPA: 3.83]

B.S. Electrical & Computer Engineering — *May 2017*
B.A. Physics
- *Highest Distinction, Magna Cum Laude* [GPA: 3.92]

Research and Work Experience

Boston University, Boston, MA — *Aug 2021 - present*
Ph.D. Researcher — Advisor: Dr. Evimaria Terzi
Approximation algorithms for team formation
- Design approximation algorithms for NP-hard team formation problems maximizing coverage minus cost.

Max Planck Institute-SWS, Saarbrücken, Germany — *May - Aug 2022*
Research Intern — Advisor: Dr. Krishna Gummadi
Content personalization in social media feeds
- Designed framework to audit user personalization on TikTok's video content recommendations.

IBM, Cambridge, MA — *Sep 2018 - Jun 2021*
Data Scientist — Supervisor: Dr. Mark Freeman
Optimizing bid pricing using machine learning
- Developed a novel method for bid price optimization in Python for a B2B competitive pricing setting.
- Built a REST API framework to handle real-time pricing requests in under 2 seconds. Successfully released pricing engine as a microservice for *Verizon Communications*.

Automating pre-authorization for surgical procedures
- Developed a rules engine in Python and extracted contextual language features from patient clinical data. Deployed natural language model framework on AWS for *CVS Health*.

Data engineering for dashboards
- Wrote SparkSQL code for large datasets, to enhance dashboard capabilities for *Apple Media Products*.

Brand Networks, Rochester, NY — *Jan - May 2018*
MS Capstone Practicum — Mentor: Dr. Ajay Anand
- Identified optimal Facebook ad-campaign configurations using SQL scripts. Developed classification models in Python to predict KPIs and presented a metric-driven campaign configuration process.

Audio Information Research Lab, University of Rochester — *May - Aug 2016*
Xerox Research Fellow — Mentor: Prof. Zhiyao Duan
- Developed an automated lyric display system for live music performances in Java. Used a real-time implementation of the dynamic time warping algorithm to align annotated and live temporal sequences.

Selected Publications

Vombatkere, Terzi, & Gionis. (2024). **Forming Coordinated Teams that Balance Task Coverage and Expert Workload**. Springer Data Mining and Knowledge Discovery.

Vombatkere, Mousavi, Zannettou, Roesner, & Gummadi. (2024). **TikTok and the Art of Personalization: Investigating Exploration & Exploitation on Social Media Feeds**. The Web Conference 2024.

Vombatkere, Terzi. (2023). **Balancing Task Coverage and Expert Workload in Team Formation**. SIAM International Conference on Data Mining 2023.

Kritharakis, Luo, Unnikrishnan, & Vombatkere. (2022). **Detecting Trends in Streaming Financial Data using Apache Flink**. ACM International Conference on Distributed & Event-Based Systems 2022.

Vombatkere, Lyu, & Luo. (2021). **How Political is the Spread of COVID-19 in the United States?** International Conference on Social Computing, Behavioral-Cultural Modeling 2021. Springer, Cham.

Vombatkere, Li, & Duan. (2017) **Automatic Lyrics Display System for Live Music Performances**. IEEE Signal Processing Magazine 2017.

Teaching Experience

Boston University

- CS 132: Linear Algebra - Geometric Algorithms *Spring 2024*
- CS 131: Combinatoric Structures *Summer 2024*
- CS 565: Algorithmic Data Mining *Spring 2023*
- BU CS Summer Challenge Course *(Instructor)* *Summer 2023, 2024*

University of Rochester

- ECE 231: Applied Electromagnetism
- ECE 111, ECE 112: Analysis of Electrical Circuits and Logic Circuit Design
- MTH 161, MTH 162: Differential and Integral Calculus
- PHY 113, PHY 122: Mechanics and Electricity & Magnetism
- AST 105, AST 106: Introductory Astronomy

Selected Projects

Coresets for Clustering & Streaming *2021*
Python implementation of Coreset algorithms for clustering and streaming.

Settlers of Catan Framework *2021*
Full implementation of Catan boardgame with AI agents.

Ultimate TicTacToe AI *2018*
Developed a heuristic AI with adversarial search using Minimax, that beat a control player in 99% games.

Enigma Simulator *2017*
Object-oriented implementation of the WWII Enigma machine.

Augmented Audio Reality Binaural Headphones *2017*
Designed and built binaural headphones with real-time recording and filtering capability and < 12 ms latency.

Non-linear Dynamics of Damped & Driven Pendulum *2016*
Developed a theoretical framework and computationally found regions of chaotic and non-chaotic motion.

Honors and Awards

University of Rochester Merit Scholarships *[Genesee Scholarship, Dean's Scholarship]*
Awarded full scholarship for undergraduate tenure.

Citation for Achievement in College Leadership
Awarded for demonstrating outstanding undergraduate teaching and research commitment.

Donald M. Barnard Engineering Prize
Awarded annually to one senior for high personal achievement in Electrical & Computer Engineering.

Tau Beta Pi Engineering Honor Society *[National Tau Beta Pi Scholarship]*

Phi Beta Kappa Honor Society

Technical Skills

Proficient: Python, SQL, Java, LaTeX, git
Familiar: Linux, MATLAB, C

Extracurriculars

Boston University Club Tennis Team *2023 - Present*
Rochester Club Tennis Team, *Competed at USTA TOC National Championships 2018* *2013 - 2018*
Men's Rowing Team, *Competed as a rower in coxed fours and eights* *2014 - 2015*