Aram Ebtekar
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Computer Scientist

Work Experience

2020 – 2021
- **Independent Research:** coming soon!

2018 – 2019
- **Senior AI Research Scientist at Mythic:** lead in two exploratory efforts: video super-resolution, covering the entire pipeline from realistic dataset collection to neural architecture design; and hardware co-design investigations on how efficiently convolutional layers map to hardware, and how much accuracy the resulting models retain over time.

2016 – 2018
- **Behavior Prediction Researcher/Engineer at Waymo:** framing real-world problems mathematically; deriving novel optimization algorithms and deploying them on the cars to predict surrounding agents on the road in real-time; leading a study+brainstorm group to explore long-term approaches, particularly in deep reinforcement learning; a bit of graphics work for visualization.

Education

Self-Directed Studies

2019 – 2020
- Graduate-level studies in algorithmic information theory, reinforcement learning, stochastic processes, statistical mechanics, and economics; elementary studies in cybersecurity, distributed databases, finance, law & ethics, music, dance, creative writing, Persian, and Mandarin

Carnegie Mellon University

2012 – 2015
- Ph.D. candidate in Computer Science (dropped with M.S.)
- Teaching Assistant for 15-451/651 (Algorithms) taught by Avrim Blum and Anupam Gupta
- Completed the 2012 Summer School in Algorithmic Economics
- NSERC Alexander Graham Bell Canada Graduate Scholarship
- Memberships: Graduate Student Assembly departmental representative, Ballroom Dance Club, School of Computer Science musical performances

University of British Columbia

2008 – 2012
- B.Sc. Combined Honours in Computer Science and Mathematics with Distinction
- 92% (A+) GPA, Dean's Honour List and Science Scholar standing
- President's Entrance Scholarship (top tier), Trek Excellence Scholarship, CPSC Scholarship
- 8-month game development internship at Electronic Arts, working on Need For Speed: World

Research and Personal Projects

2020
- **Elo-MMR rating system**: a Bayesian skill estimation system for massively multi-player competitions. Published as an open-source Rust crate, and as a research paper at the **Web Conference 2021**.

2020
- **Technical blogging**: one article made the front page of Hacker News and received over 200 comments.

2017
- **Rust Algorithms Cookbook**: a collection of classic algorithms elegantly crafted in Rust, serving as a proof of concept of the language's compile-time safety discipline as applied to contest programming. On 20/06/2017, it was the **#1 trending GitHub repository globally**.

Research and Personal Projects (continued)

2015   • **Cooperative multi-agent planning**: proved NP-hardness of planning with very simple constraints on visitation order, then proposed two heuristic search algorithms to handle a more general set of constraints, and proved their suboptimality bounds. Advised by Prof. Maxim Likhachev.

2014   • **Parallel A* framework**: developed a theoretical framework that generalizes A* search. Applications include anytime dynamic multi-heuristic or multi-processor search. Advised by Prof. Maxim Likhachev.

2013   • **Dynamic Łukasiewicz Game Logic**: generalized differential game logic to real-valued outcomes, and derived its sequent calculus for semi-automated theorem proving. Advised by Prof. André Platzer.

2012   • **Linking population dynamics**: designed a novel population model to represent social interactions in the context of natural selection. In scenarios resembling the Prisoner's Dilemma, theoretical and experimental analyses found the emergence of a "secret handshake" form of cooperation.

2012   • **U! Robot!:** lead engineer in a team of 8 developers, completing a platformer game that was selected to be showcased at the 48-hour Global Game Jam.

2011   • **Equitable clustering:** derived an approximation algorithm for quantizing distributions on Euclidean space, with applications to image stippling. Advised by Profs. David Kirkpatrick and William Evans.

Contest Achievements

2015   • **World 61st place** among over 50,000 registrants in the Google Code Jam

2015   • **World 57th place** in the TopCoder Open Algorithm Competition

2015   • **6th place** in the North American Invitational Programming Contest's Open Division, as a solo contestant against teams of up to three

2015   • Achieved Codeforces **Grandmaster** title, peak rating 2400+ on both Codeforces and TopCoder

2012   • **18th place** in the **ACM ICPC World Finals** in Warsaw, Poland

2011   • Top 250, Team Honorable Mention in the William Lowell Putnam Mathematical Competition

2010 – 2011   • Member of the UBC Thunderbots, which placed **9th** in the **RoboCup** SSL international robot soccer competition; I developed some AI algorithms, e.g. filters for ball and robot tracking

Sample Coursework (grad-level marked with *)

Math
- Statistical Inference*; Evolutionary Dynamics*; Number Theory*; Intro Topology; Advanced Linear Algebra; Mechanics; Algebra, Coding Theory and Cryptography

Theory
- Computational Complexity Theory*; Type Systems for Programming Languages*; Advanced Algorithm Design and Analysis; Graph Theory; Functional and Logic Programming

AI
- Statistical Machine Learning*; Multimedia Databases and Data Mining*; Kinematics, Dynamic Systems and Control*; Intelligent Systems

Misc
- Advanced Distributed Operating Systems*; RPG Writing Workshop*; Computer Graphics

Audits
- Adaptive Control & Reinforcement Learning*; Planning, Execution & Learning*; String Algorithms*; Information Theory*; Design Educational Games*; Experimental Game Design

Volunteering

2019 – 2020
- **UBC competitive programming coach:** teaching and enabling practice sessions on algorithms, data structures, problem solving, and contest strategy

2015, others
- **ICPC problem setter:** authored the problems J,L,N in the Pacific Northwest regional programming contest, and helped with additional writing/reviewing/testing; we raised the bar for programming contest quality in North America, for experts and novices alike

2013, 2015
- **FIRST Lego League research judge:** judged and gave feedback on research project presentations by teams of children aged 9-14 aimed at solving global issues using STEM principles