Mehran Shakerinava

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EDUCATION ⬦ **B.Sc. in Computer Engineering** 2014 – 2019
Department of Computer Engineering
Sharif University of Technology, Tehran, Iran
GPA: 17.39/20

RESEARCH
INTERESTS
⬦ **Machine Learning**: *Deep Reinforcement Learning, Unsupervised Learning*
⬦ **Robotics**: *Intelligent Control, Autonomy*

RESEARCH
EXPERIENCE
⬦ **High Performance Computing Architectures and Networks Laboratory (HPCAN)**
Undergraduate Research Assistant
Advisors: Prof. Hamid Sarbazi-Azadand Prof. Pejman Lotfi-Kamran

- **Data Prefetching**: DRAM access latency is the most important performance bottleneck in modern computer systems. Therefore, reducing the number of cache misses is of paramount importance. Data prefetching hides DRAM latency by predicting future memory accesses and (pre-)fetching those blocks from DRAM. In this work, I implemented and helped develop several novel algorithms for spatial data prefetching. The work has so far resulted in my *B.Sc. Thesis*, a conference paper at *HPCA 2019*, and two workshop papers at *ISCA 2019. ISCA* and *HPCA* are the most prestigious conferences in computer architecture.

⬦ **Machine Learning Laboratory (MLL)**
Undergraduate Research Assistant
Advisor: Prof. Mahdieh Soleymani Baghshah

- **Deep Reinforcement Learning**: I Assisted a senior M.Sc. student in his thesis research. I implemented many Deep Reinforcement Learning agents (DQN, A3C, etc.) and trained them on the Atari Learning Environment (ALE). I also trained environment models using data gathered from trained agents by implementing the "Recurrent Environment Simulators" paper. We performed many experiments on intrinsic motivation and exploration in Deep Reinforcement Learning.
- **Geometric Deep Learning**: We introduced a novel definition of locality in graphs, equivalent to the commute distance of vertices. Such a measure of locality can be computed via spectral embedding of the graph. A notion of locality enables the construction of Convolutional Neural Networks that can process the graph. We also theoretically proved that this method has certain appealing properties (such as being both spectral and local). I implemented and evaluated this method on various datasets.

PUBLICATIONS ⬦ M. Bakhshalipour, **M. Shakerinava**, P. Lotfi-Kamran, and H. Sarbazi-Azad, "Bingo Spatial Data Prefetcher," in *International Symposium on High-Performance Computer Architecture (HPCA)*, 2019.

WORKSHOP PAPERS	⋄ M. Bakhshalipour, **M. Shakerinava**, P. Lotfi-Kamran, and H. Sarbazi-Azad, "Accurately and Maximally Prefetching Spatial Data Access Patterns with Bingo," in *The Third Data Prefetching Championship (DPC3)*, in conjunction with *International Symposium on Computer Architecture (ISCA)*, 2019.
	⋄ **M. Shakerinava**, M. Bakhshalipour, P. Lotfi-Kamran, and H. Sarbazi-Azad, "Multi-Lookahead Offset Prefetching," in *The Third Data Prefetching Championship (DPC3)*, in conjunction with *International Symposium on Computer Architecture (ISCA)*, 2019.

HONORS AND AWARDS	⋄ **1st Place** (among over 30,000 participants) *Iran's National MSc Entrance Exam* Computer Engineering track, AI & Robotics major	2019
	⋄ **2nd and 3rd Place (1st and 2nd Place in Multi-Core Setting)** *The Third Data Prefetching Championship (DPC3) at ISCA 2019*	2019
	⋄ **1st Place** Programming Contest at Iran's 3rd National Python Conference (*PyCon 2016*)	2016
	⋄ **Silver Medal** (Ranked ~15 among ~10,000) 21st *Iranian National Olympiad in Informatics*	2012

TEACHING EXPERIENCE	⋄ **Instructor** *Informatics Olympiad (2012 – 2015)* NODET High-School
	Taught topics on Combinatorics, Graph Theory, Algorithms, and Programming.
	⋄ **Teaching Assistant** *Fall 2016 - Advanced Programming* Sharif University of Technology, Tehran, Iran
	Held a recitation class on Regular Expressions. Designed and graded a Quiz on Object-Oriented Programming and Regular Expressions. Designed a programming assignment.
	⋄ **Teaching Assistant** *Spring 2018 and Spring 2019 - Artificial Intelligence* Sharif University of Technology, Tehran, Iran
	Designed and graded assignments, covering Reinforcement Learning, Bayesian Networks, Adversarial Search, and Machine Learning. Designed programming assignments on Reinforcement Learning and Perceptrons. Held recitation classes for clarifying and solving assignments. Answered newsgroup/email queries.

SELECTED COURSES	⋄ **B.Sc., Sharif University of Technology**:

- Multivariate Calculus (20/20)
- Advanced Programming (19.5/20)
- Data Structures and Algorithms (20/20)
- Automata and Compilers (20/20)
- Linear Algebra (19.6/20)
- Deep Learning (TBD)

- Artificial Intelligence (18.6/20)
- Computer Networks (18.7/20)
- Signals and Systems (19/20)
- Real-Time Systems (18.2/20)
- Foundations of Neuroscience (17.8/20)
- B.Sc. Thesis (20/20)

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SELECTED
PROJECTS

◇ **2048 AI**
Fall 2014 - Intro to Programming Open-ended Homework Problem
An AI for the game 2048, based on Monte-Carlo tree search and a custom evaluation function. It's able to reach a 4096 tile.

◇ **Flight Control Game**
Fall 2014 - Intro to Programming Project
A clone of Flight Control written in C with GTK.

◇ **Bare Metal Raspberry Pi Programming**
Fall 2015 - Computer Structure and Language Project
Programmed a Raspberry Pi in ARM assembly to draw the Sierpinski triangle with a Rule 90 cellular automaton. *(Best class project)*

◇ **15-Puzzle AI and GUI**
Fall 2015 - Advanced Programming Midterm Project
A GUI for a 15-Puzzle game, and an AI that can solve it. Written in C++ with Qt.

◇ **Pacman Game**
Fall 2015 - Advanced Programming Final Project
A clone of classic Pacman written in C++ with Cocos2d-x.

◇ **Pipelined Processor**
Spring 2016 - Computer Architecture Bonus Project
Verilog implementation of the 5-stage classic RISC pipeline.

◇ **Cython Compiler**
Fall 2016 - Automata and Compilers Project
Wrote a compiler for a made-up programming language called Cython. The compiler used LALR(1) parsing and was written in C++ with Flex, Bison, and LLVM.

◇ **FPGA Odometry**
Fall 2016 - Digital Systems Design Project
Implemented odometry in C on Arduino and afterward, in Verilog on FPGA. Constructed a differential drive robot with optical wheel encoders (consisting of encoder disks and photoelectric sensors), and tested the implementation on it successfully. *(Best Class Project)*

◇ **Video Streaming WiFi Robot**
Spring 2018 - Hardware Lab
Assembled and programmed a WiFi-controlled differential drive robot with a camera, based on the Arduino platform. The video is streamed to a responsive web-based UI from which the robot can be remotely controlled.

◇ **CUDA K-Means**
Spring 2019 - Multi-Core Computing
Implemented a highly efficient CUDA kernel for the k-means clustering algorithm.

VOLUNTARY
WORK

◇ **8th and 9th Sharif AI Challenge**
Sharif University of Technology, Tehran, Iran (2016 and 2017).
Technical Staff (C++ Client)

SKILLS	⋄ Assembly, C/C++, Java, Python, MATLAB, PyTorch, TensorFlow, CUDA, Git, Verilog, FPGA, Microcontroller, Arduino, SQL, HTML, CSS, JavaScript, Bash, Linux, LaTeX

LANGUAGES	⋄ Persian (Mother Tongue)
	⋄ English (Fluent)

  • TOEFL (Reading: 30, Listening: 30, Speaking: 27, Writing: 26)
  • GRE (Quantitative: 170, Verbal: 162, Writing: 3.5)

⋄ Swedish (Basic)