Parsa Kamalipour

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Research Interests

- Design & Analysis of Algorithms
- Graph Theory & its applications
- Combinatorial Optimization
- Approximation & Randomized Algorithms
- Complexity Theory & Online Algorithms
- Social Networks Analysis

Education

Concordia University **Montreal, QC, Canada**
Master of CS. Thesis-based in Computer Science, advised by Prof. Hovhannes Harutyunyan *Sep 2024–Present*
- **GPA:** 3.53/4.0
- **Research Topics:** Community Detection, Social Networks Analysis, Algorithms Design, Graph Theory

Vali-e-Asr University of Rafsanjan **Rafsanjan, Iran**
B.Sc. in Computer Engineering, advised by Dr. Fahimeh Dabaghi-Zarandi *Sep 2018–Jun 2023*
- **GPA:** 16.26/20.0 ***Graduated with Honors***
- **Research Topics:** Community Detection, Algorithms Design, Machine Learning, Software Refactoring

Publications

- *From Dense Graphs to Meaningful Communities: Assessing Community Quality Using Geodesic Distance Modularity on Metric Backbone-Sparsified Networks*
  - **Parsa Kamalipour** and Hovhannes Harutyunyan [*Submitted to The 12 International Conference on Social Networks Analysis, Management and Security (SNAMS 2025)*]
- *LLM-Based Code Translation for Cross-Language Refactoring Mining*
  - Iman Hemati Moghadam, Mohammad Mehdi Afkhami, Vadim Zaytsev, Mohammad Hossein Ashoori, Hossein Bazmandegan, and **Parsa Kamalipour** [*In Revision at Empirical Software Engineering journal (EMSE)*]
- *Extending refactoring detection to Kotlin: A dataset and comparative study*
  - Iman Hemati Moghadam, Mohammad Mehdi Afkhami, **Parsa Kamalipour**, and Vadim Zaytsev [*The 31st IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2024)*, doi.]
- *Community detection in complex network based on an improved random algorithm using local and global network information*
  - Fahimeh Dabaghi-Zarandi, **Parsa Kamalipour** [*Journal of Network and Computer Applications (JNCA)*, vol.206, p.103492, Aug 2022, doi.]

Experiences

Research Experience

Algorithms & Complexity Lab, Concordia University **Montreal, QC, Canada**
Graduate Research Assistant, Supervisor: Prof. Hovhannes Harutyunyan *Aug 2024 – Present*
- Conducting research in **algorithm design, graph theory, and social network analysis**, with emphasis on large-scale social networks.
- Investigating **Geodesic Distance Metric and parameter-free sparsification** methods to evaluate and enhance community detection.
- Developing new **theoretical frameworks and algorithms** to advance the study of community quality in networks.

Formal Methods and Tools (FMT) Group, University of Twente **Enschede, The Netherlands**
Research Collaborator (Remote), Supervisor: Dr. Iman Hemati Moghadam *Aug 2023 – Mar 2024*
- Implemented the **"KotlinCode2Text" parser** and integrated it into the **"RefDetect" tool** for automated refactoring detection.
- Built two refactoring datasets supporting empirical evaluation of refactoring detection techniques.
- Improved tool performance via systematic testing, debugging, and algorithmic optimizations.
- Explored **prompt engineering with large language models (LLMs)** to enhance software translation tasks.

Department of Computer Engineering, Vali-e-Asr University of Rafsanjan **Rafsanjan, Iran**
Undergraduate Research Assistant, Supervisor: Dr. Fahimeh Dabaghi-Zarandi *Aug 2021 – Mar 2024*
- Investigated algorithmic approaches for solving complex problems in **graph theory**.
- Implemented and validated graph algorithms in **MATLAB and Python**.
- Curated datasets and evaluated algorithmic performance through experimental studies.
- Drafted preliminary manuscripts and contributed to research publications.

Teaching Experience

Gina Cody School of Engineering and Computer Science, Concordia University — **Montreal, QC, Canada**
Graduate Teaching Assistant — *Sep 2024 – Present*

- Led tutorials, graded assignments and exams for core undergraduate courses, including **Algorithms, Programming Languages, and Data Systems**.
- Supported student learning through **Programmer On Duty (POD)** [Q&A Sessions], assignment guidance, and evaluation.
- Courses:
  - COMP 233: Probability and Statistics for Computer Science (Summer 2025)
  - COMP 348: Principles of Programming Languages (Winter 2025, Summer 2025)
  - COMP 465: Design and Analysis of Algorithms (Winter 2025)
  - SOEN 363: Data Systems for Software Engineers (Winter 2025)
  - COMP/MATH 339: Combinatorics (Fall 2024)
  - COMP 335: Introduction to Theoretical Computer Science (Fall 2024, Summer 2025)

Department of Computer Engineering, Vali-e-Asr University of Rafsanjan — **Rafsanjan, Iran**
Undergraduate Teaching Assistant — *Mar 2021 – Jan 2024*

- Served as **Head TA and Tutorial Leader** for multiple foundational CS courses, mentoring students and overseeing grading.
- Collaborated with faculty to design assignments, run labs, and support student projects in algorithms, data structures, and software engineering.
- Courses:
  - Data Structures (Spring 2021–2023, Fall 2021–2023)
  - Algorithms Design (Spring 2021–2023, Fall 2021–2022)
  - Discrete Mathematics (Fall 2021, Spring 2022)
  - Operating Systems (Spring 2022)
  - Introduction to Information Retrieval (Spring 2022–2023)
  - Software Engineering (Spring 2023)
  - Database Systems (Fall 2022)
  - Fundamentals of Programming (Fall 2022)
  - Artificial Intelligence (Fall 2022)
  - Introduction to Data Mining (Spring 2023)

Industry Experience

Null References: Game Development Team — **Kerman, Iran**
Team Co-Founder & Indie Game Developer — *Feb 2020 – Sep 2021*

- Co-founded an indie game development team, collaborating on all stages of game design and implementation.
- Applied **Design Patterns** and **SOLID principles** to develop a demo of the video game *Uncertainty*.
- Released the project as an **open-source game** on GitHub, contributing to community-driven development.

Honors and Awards

2024: **DRW Graduate Scholarship in Computer Science** – Concordia University & DRW Company

2024: **Concordia Merit Scholarship (Entrance Scholarship Award)** – Concordia University, School of Graduate Studies

2024: **Financial Research Support (FRS)** – Concordia Faculty of Engineering and Computer Science

2023: **Distinguished Student Award** – Awarded among all students of Vali-e-Asr University

2023: **Undergraduate Researcher Award** – Awarded among all undergraduate students of Vali-e-Asr University

2023: **Top Researcher Award** – Earned this prestige award among all undergraduate students of Kerman Province

Selected Projects

Introduction to Data Mining
Multiple assignments regarding to the Intro to Data Mining course — *Spring 2022*
Data Pre Processing, Apriori Algorithm, Data Visualization, K-Means, Agglomerative Clustering, DBSCAN, K-Nearest Neighbors Algorithm, Decision Tree, Support Vector Machines, Multi-Layer Perceptron

Uncertainty: an action-adventure space-shooter game built with Unity3D
Null References — *Spring 2021*

- Uncertainty is an action-adventure space-shooter game, and currently It's under development.
- We have utilized the beta version of this game as our "Software Engineering Lab" course project.

Multiple projects regarding to Design and Analysis of Algorithms course
Designing and implementation of: — *Fall 2020*
The Closest Pair of Points Problem, Sudoku Solver, Tournament Scheduler, Huffman Coding, Bellman–Ford, Matrix Chain Multiplication, N-Queens Solver Traveling Salesman Problem

Multiple projects regarding to Data Structures and Algorithms course
Designing and implementation of: — *Fall 2019*
the Red-Black Tree, the AVL Tree, the Trie Dictionary, Threaded Binary Tree, the Sparse Matrix via Linked List, the Rat in the maze problem

Skills

Programming Languages: C, C++, Python, MATLAB, C#, Java, SQL

Frameworks & Libraries: Qt, NumPy, Pandas, Matplotlib, NetworkX, Scikit-learn, PyTorch, Unity

Algorithms & Data Science: Graph Algorithms, Community Detection, Social Network Analysis, Machine Learning

Software Engineering: Refactoring, Debugging, Unit Testing, Agile Methodologies, Design Patterns, SOLID Principles

Tools & Platforms: Linux, Git, Jupyter, LaTeX, Markdown, Microsoft Office, Obsidian

Soft Skills: Teamwork, Leadership, Collaboration, Teaching, Research, Problem Solving

Selected Relevant Coursework

Graduate: Algorithm Design Techniques, Advanced Analysis of Algorithms, Combinatorial Algorithms, Machine Learning

Undergraduate: Design and Analysis of Algorithms, Data Structures, Discrete Mathematics, Programming Language Design, Artificial Intelligence, Software Engineering, Fundamentals of Data Mining, Compiler Design, Operating Systems, Computer Architecture

Test Scores

TOEFL: 99/120 - Reading: 26/30, Listening: 29/30, Speaking: 23/30, Writing: 21/30

Languages

Persian: Native

English: Proficient

French: Beginner (A1)

Volunteer Experience

Vali-e-Asr University Scientific Association of Computer Engineering
Director, Research Assistant Committee — *Nov 2022 – Sep 202it3*

Vali-e-Asr University Scientific Association of Computer Engineering
Director, Teaching Assistant Committee — *Jul 2022 – Sep 2023*

Vali-e-Asr Collegiate Programming Contest (VCPC)
Teaching Staff Member — *Sep 2021 – Jun 2022*

References

Available upon Request