Parsa Kamalipour

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Research Interests

- Design & Analysis of Algorithms
- Graph Theory & its applications
- Combinatorial Optimization
- Approximation & Randomized Algorithms
- Machine Learning & Graph Mining
- Social Networks Analysis & Complex Networks

Education

Concordia University **Montreal, QC, Canada**
Master of CS (Thesis-based) in Computer Science, advised by Prof. Hovhannes Harutyunyan *Sep 2024–Present*
- **GPA:** 3.58/4.0
- **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

- *Spider Community Detection: Seeded Geodesic Expansion with Modularity-Guided Refinement and Greedy Merge Matching*
  - Hovhannes Harutyunyan and **Parsa Kamalipour** [*In revision at Computers, 2026*]
- *From Dense Graphs to Meaningful Communities: Assessing Community Quality Using Geodesic Distance Modularity on Metric Backbone-Sparsified Networks*
  - **Parsa Kamalipour** and Hovhannes Harutyunyan [*Accepted and in proceeding of The 12th 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)*, 2022, doi.]

Experiences

Research Experience

Algorithms & Complexity Lab, Concordia University **Montreal, QC, Canada**
Graduate Research Assistant, Supervisor: Prof. Hovhannes Harutyunyan *Aug 2024 – Present*
- Conduct research in **graph algorithms, community detection, and large-scale network analysis** on real-world social networks.
- worked on **Geodesic Distance Modularity (GDM)** and introduced **Weighted Average GDM (wGDM)** to assess local community quality on **Metric Backbone-sparsified graphs**.
- Developed the **Spider local community detection algorithm** and theoretical analysis for parameter-free sparsification frameworks.

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*

- Delivered **tutorials** and **laboratory demonstrations**, **graded assignments and exams**, and provided student support through **Programmer On Duty (POD)** sessions, office hours, and detailed feedback on coursework and projects.
- Courses:
  - COMP 233: Probability and Statistics for Computer Science (Summer 2025, Fall 2025)
  - COMP 248: Object-Oriented Programming I (Fall 2025, Winter 2026)
  - COMP 335: Introduction to Theoretical Computer Science (Fall 2024, Summer 2025)
  - COMP 339: Combinatorics (Fall 2024, Fall 2025)
  - COMP 348: Principles of Programming Languages (Winter 2025, Summer 2025)
  - COMP 465: Design and Analysis of Algorithms (Winter 2025)
  - COMP 472: Artificial Intelligence (Fall 2025)
  - SOEN 363: Data Systems for Software Engineers (Winter 2025, Fall 2025, Winter 2026)
  - COEN 311: Computer Organization and Software (Fall 2025, Winter 2026)
  - COEN 317: Microprocessor-Based Systems (Fall 2025, Winter 2026)

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

2025: **Awarded Concordia Conference and Exposition Allowance** – Concordia University

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 in 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	Python, C, C++, C#, Java, MATLAB, Ruby, Clojure, Bash, Assembly (x86, ARM), VHDL
Web & App	HTML, CSS, Django, .NET, Unity Engine
Databases	PostgreSQL, MySQL, MongoDB, Neo4j
ML & Data	NumPy, Pandas, SciPy, Scikit-learn, PyTorch, Matplotlib, Seaborn, NetworkX, iGraph
ML on Networks	Community Detection, Link Prediction, Node Classification, Network Embeddings, Feature Engineering, Model Evaluation
Algorithms & Graphs	Graph Algorithms, Social Network Analysis, SNAP & Network Datasets, LFR, Large-Scale Graph Processing, Experimental Reproducibility
Tools	Linux, LaTeX, Jupyter, Markdown, Obsidian, Git, Docker
Software Eng.	Refactoring, Debugging, Unit Testing, Agile, Design Patterns, SOLID
Academic	Technical Writing, Peer Review, Tutorial Instruction, Grading, Teamwork, Leadership

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, Artificial Intelligence, Software Engineering, Fundamentals of Data Mining

Test Scores

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

Languages

Persian: Native **English**: Proficient (C1) **French**: Pre-intermediate (A2)

Volunteer Experience

Vali-e-Asr University Scientific Association of Computer Engineering
Director, Research Assistant Committee *Nov 2022 – Sep 2023*

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