Alireza Mohaghegh Dolatabadi

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EDUCATION

University of Waterloo	Waterloo, Ontario
Honours Computer Science with Combinatorics & Optimization Minor;	*Sep 2023 - Dec 2027*
GPA: 4.0/4.0	

EXPERIENCE

Compiler Software Engineer — Toronto, Ontario
Groq - Internship — *September 2025 – December 2025*
- Added novel architecture support to **inference engine**, expanding model compatibility for multimodal workloads
- Implemented **PyTorch** AOT validation pipeline comparing CPU vs LPU to catch inference and hardware bugs
- Implemented optimization & scheduling passes in Groq's MLIR-based **LPU** compiler, boosting model performance

Quantitative Developer — Toronto, Ontario
Oracle Alpha - Internship — *January 2025 – April 2025*
- Migrated feature generation from **Dask** to **Snowflake**'s UDTF, reducing runtime by **90%** and costs by **98%**
- Architected **500+** beta features, developing framework for table generation, regression logic, and dynamic updates
- Created templates to align feature spec with implementation, resolving consistency issues across **10,000+** features

Data Engineer — Remote
Cohere – Part-time Contract — *October 2024 – August 2025*
- Evaluated AI models' problem-solving skills, solving and correcting advanced math and programming questions

Mathematics Olympiad Instructor — Remote
Top Olympiad High Schools — *July 2022 – July 2023*
- Taught **65+** students advanced **Combinatorics** and **Graph Theory**, preparing them for Olympiad competitions
- Mentored students to achieve **5 gold** medals in both **National and International Mathematics Olympiads**

PROJECTS

SpecLoRA | 🔗
- Engineered speculative decoding system with adaptive **LoRA** training, achieving **1.5-2x** LLM inference speedup
- Built automated failure collection pipeline, fine-tuning draft models to increase acceptance rates and speed

UW Course Planner | 🔗 | 🔗
- Developed a course schedule tool using **Django/Next.js**, reducing planning time for **100+** active student users
- Deployed with **Docker**/**Nginx** for scalability and implemented **JWT authentication** with **PostgreSQL**

PQTree library | 🔗
- Optimized SageMath's PQTree using **Rust** with multi-threading, increasing performance by **200%** in benchmarks
- Added new functionalities based on this paper's algorithms, enabling support for **planar graphs** in the library

AWARDS & ACHIEVEMENTS

National Mathematics Olympiad - Silver Medalist — *September 2021*
- Ranked **12th** out of **20,000+** participants in the National Olympiad contest that served as a qualifier for the International Mathematics Olympiad, **IMO**

National Entrance Exam - Ranked 56th — *September 2022*
- Ranked **56th** out of **145,000+** in the highly competitive National Entrance Exam, testing advanced mathematics, physics, and analytical reasoning

Combinatorics Olympiad (ICO) - Silver Medalist — *June 2022*
- Competed with talented participants and esteemed math olympiadists from around the world in a **Combinatorics** competition, securing a prestigious **silver medal**

SKILLS

Languages: Python, C/C++, Rust, Java, Mojo, GoLang

Libraries & Frameworks: PyTorch, Pandas, DBT, NumPy, Dask, Flask, Django, Node.js

Tools & Technologies: Git, Docker, Slurm, GBQ, Snowflake, PyTest, Nginx, PostgreSQL,, Apache Airflow