Cătălin-Alexandru Rîpanu

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Relevant Education

POLYTECHNIC University of Bucharest **September 2020 – July 2024**
Faculty of Automatic Control and Computers *Bucharest, Romania*

- **Earned** a **Bachelor's Degree** in Computer Science and **Engineering** achieving a **GPA** of 9.805 / 10.00 (3.92 / 4.00).
- Relevant **coursework**: Artificial Intelligence, Machine Learning, Quantum Computing, Data Structures, Algorithm Analysis, Algorithm Design, Numerical Methods, Formal Languages and Automata Theory, Programming Paradigms, Operating Systems, Parallel and Distributed Programming, Computer Architectures and Computer Networking.

Relevant Work Experience

POLYTECHNIC University of Bucharest **September 2024 – Present**
Teaching Collaborator and Associate Researcher of AI-MAS Laboratory *Bucharest, Romania*

- Engaged in extensive research on various models & architectures in Computer Vision and Natural Language Processing.

POLYTECHNIC University of Bucharest **February 2022 – Present**
University Graduate Teaching Assistant *Bucharest, Romania*

- Taught students **Programming & Mathematical subjects** to deepen their **understanding** of computer internals.
- Assisted in grading student projects and served as an invigilator alongside professors during midterms and final exams.

Personal Projects

QRKT-GAN: Neural ODE Generative Network with Quantum Vision Transformers | *Quantum* **July 2024**

- Implemented using **Pytorch**, **Jax** and **Flax** a *Generative neural network with Quantum* tested on **CIFAR10 images**.
- Designed a Variational Quantum Circuit in **TensorCircuit**, harnessing **Quantum Entanglement** through Bell states.
- Created a Quantum Vision Transformer Architecture that leverages Runge-Kutta Numerical Methods for better scores.
- Evaluated and compared it alongside a model presented at **NeurIPS 2021**, showing promising results in Quantum AI.

IoT Platform using Microservices for Time Series Data | *MQTT, Grafana, Portainer, CI/CD, Flask* **June 2024**

- Implemented a *Platform* for manipulating Numerical Data coming from a large number of Internet of Things devices.
- Deployed **Grafana** in a Docker environment to visualize data and gain analytical insights through edited dashboards.
- Utilized **Portainer** in Docker Swarm to **monitor** Load Balancing effects of container **replicas** using **multiple** nodes.
- Employed **GitLab's CI/CD** for further comprehending builds & tests automation and software development practices.

COOL Compiler with ANTLR v4.0 Generator | *Lexer, Parser, Code Generation, Java, MIPS, COOL* **Feb 2024**

- Developed a **Java-based** *Compiler* for an Object-Oriented Programming language, incorporating **basic inheritance**.
- Designed **Lexical Analysis** utilizing **ANTLR4.13** to construct a grammar that accurately recognizes language tokens.
- Defined Resolution and Definition Pass traversals using **Visitor** Pattern for creating Syntactic and Semantic Analyzes.
- Developed Code Generation for translating any COOL code into MIPS Assembly. Used the *SPIM* Simulator for testing.

2016 Halite Bot | *Algorithm Design and Analysis, C++, Machine Learning, Artificial Intelligence* **May 2022**

- Implemented in **C++** a *Halite bot* using a **Runtime Engine** integrated within a **Framework** given by the organisers.
- Processed in a **Greedy** way the cells with the highest scores first to let the bot being able to conserve its strength score.
- Developed a **logic** such that if a border cell cannot attack, it will look for a neighboring cell with which it can combine.
- Implemented a **surplus strength** redistribution algorithm that evenly allocates excess power score to neighboring cells.

Extracurricular Activities

3DPUB Summer School **June 2022**
2^{nd} *Year Student* *Bucharest, Romania*

- *Attended* in five **Gameloft** *workshops* gaining deeper knowledge of **Computer Vision** and **Fast** Game Development.

Awards

National Student Mathematics Competition "Traian Lalescu" **November 2021**
2^{nd} *Year Contestant* *Transilvania University of Brasov, Romania*

- Earned honorable mention in the **Complex Analysis** section at the **National phase** of the mathematics competition.

Skills

Technical Skills

- Intermediate Knowledge: Data Structures, Algorithms, C/C++, Python, Java, Networking, Numpy, Pandas, Pytorch
- Basic Knowledge: TensorFlow, Jax / Flax, TensorFlow Quantum, DevOps, CUDA, Flask, SQL, Haskell, Prolog, *React*

Languages

- Romanian: Native Speaker
- English: Professional Level
- French: Good Command