Henrique Soares Assumpção e Silva

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Education

MSc in Computer Science Mar 2025 - Present
Universidade Federal de Minas Gerais, Brasil *GPA: 97%*

- **Focus**: Graph Theory and Optimization.
- **Advisors**: Prof. Gabriel Coutinho and Prof. Csaba Schneider.

BSc in Computer Science Jan 2020 - Feb 2025
Universidade Federal de Minas Gerais, Brasil *GPA: 94%*

- **Undergraduate Thesis**: Álgebras, grupos e grafos.
- **Advisor**: Prof. Gabriel Coutinho.
- **Minor**: Pure Mathematics.

Professional Experience

Machine Learning Researcher Jun 2025 - Ongoing
Inter Science, Brasil *Full Time*

- Lead developer of CodeEvolve, an open source implementation of Google Deepmind's AlphaEvolve. Engineered an evolutionary coding agent capable of automating algorithmic discovery and optimization.
- Implemented complex machine learning architectures using **PyTorch**, enabling the agent to iteratively improve code performance with minimal human intervention.
- Optimized training pipelines for Large Language Models (LLMs) on distributed systems, focusing on reducing inference latency and memory overhead for banking security applications.

Undergraduate Researcher Aug 2021 - Feb 2022
Inter/DCC-UFMG, Brasil *Internship*

- Architected *DELATOR*, a Graph Neural Network framework using **DGL** and **PyTorch** to detect money laundering patterns across a massive financial network.
- Scaled the solution to process a production graph with over **20 million accounts** and **100 million transactions**, identifying suspicious activity previously undetected by rule-based systems.
- Results published at *IEEE Big Data 2022*; presented findings on scalable GNNs to the scientific community in Osaka, Japan.

Data Science Instructor Jun - Dec 2022
Usiminas/DCC-UFMG, Brasil *Part time*

- Designed and delivered a comprehensive curriculum on Python, Pandas, and PyTorch, upskilling engineering teams at a major steel manufacturer to adopt data-driven workflows.
- Mentored multidisciplinary teams in building and deploying internal ML tools, resulting in the automation of manual data analysis tasks.

A.I. Research & Development Mar - Aug 2021
Plus Three, USA *Part Time*

- Engineered end-to-end NLP pipelines for automated question-answering and text generation, integrating transformer-based models into client-facing web applications to enhance chatbot capabilities.
- Authored a series of technical articles on AI ethics and bias for the nonprofit *AIandYou*, translating complex algorithmic concepts for a broad non-technical audience.

Research Projects

Quantum Computing for finance Jan 2025 - Jun 2025

Inter/DCC-UFMG, Brasil

- Developed a Quantum Support Vector Machine (QSVM) using **Qiskit** to benchmark quantum kernel methods against classical ML baselines for fraud classification.
- Simulated quantum circuits on high-dimensional banking data to evaluate the feasibility of quantum advantage in financial risk modeling.

Graph theory and optimization Mar 2023 - Jan 2025

DCC-UFMG, Brasil

- Conducted research in graph theory and semidefinite optimization, obtaining novel results for graph parameters related to NP-hard problems such as MAXCUT and MAX 2-SAT, and co-authored a paper exhibiting the results, submitted in 2025.
- Utilized spectral graph theory to develop novel algorithms for analyzing connectivity patterns in biological neural networks (clinical brain data).

Predictive maintenance for industrial machinery May - Jul 2021

MINASLIGAS/DCC-UFMG, Brasil

- Built and deployed a Variational Autoencoder (VAE) in PyTorch to detect anomalies in time-series telemetry from steel machinery, increasing failure prediction accuracy by **10%**.
- Collaborated on a full-stack dashboard to visualize real-time machinery health, reducing operational downtime through data-driven alerts.

Sentiment analysis on online mental health communities Dec 2020 - May 2021

DCC-UFMG, Brasil

- Developed a novel Recurrent Neural Network model in Pytorch for sentiment analysis on mental health online communities. The model efficiently and accurately predicted shifts in the emotional tone of online users, and outperformed all considered baselines by an average of **20%**.
- Co-authored a scientific paper published at *Future Generation Computer Systems*, an international journal that allowed for greater disclosure of our work.

Papers

- **Henrique Assumpção**, Diego Ferreira, Leandro Campos, Fabricio Murai. CodeEvolve: An open-source evolutionary coding agent for algorithmic optimization. *Preprint*, 2025.
- **Henrique Assumpção**, Gabriel Coutinho. Semidefinite programming bounds on fractional cut-cover and maximum 2-SAT for highly regular graphs. *Submitted*, 2025.
- **Henrique S. Assumpção**, Fabrício Souza, Leandro Lacerda Campos, Vinícius T. de Castro Pires, Paulo M. Laurentys de Almeira, Fabricio Murai. DELATOR: Money Laundering Detection via Multi-Task Learning on Large Transaction Graphs. *IEEE BigData*, 2022. Earlier version published in *Brazilian Workshop on Social Network Analysis and Mining* (BraSNAM), 2022.
- Bárbara Silveira, **Henrique S. Silva**, Fabricio Murai, Ana Paula C. da Silva. Predicting user emotional tone in mental disorder online communities. *Future Generation Computer Systems*, 2021.

Technical Skills

Languages: Python, C++, C, CUDA, Rust, SQL, Java, JavaScript
Machine Learning: PyTorch, TensorFlow, JAX, Scikit-Learn, DGL, HuggingFace
Infrastructure & DevOps: Docker, Kubernetes, AWS, Apache Spark, Git/GitLab, Linux
Natural Languages: Portuguese (Native), English (C2), Spanish (B2), French (B1)

Awards

- Best Paper Award at the *XI Brazilian Workshop on Social Network Analysis and Mining* (BraSNAM), 2022.