Xavi Arnal

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Website | GitHub | Linkedin

Mathematician by training and medalist at the International Mathematics Competition, with a research background spanning machine learning and cryptography. Recently, I've shifted focus toward software design and data science. After my last academic role, I took a sabbatical to pursue this transition, using the time to develop two significant software projects independently, included below as practical demonstrations of ability to design, build, and deploy real systems.

Experience

Performance analytics researcher | *NVIDIA + TU/e* JAN 2023 - SEP 2023

- Developed telemetry and performance analysis tools to identify performance bottlenecks.
- Researching fast implementation of post-quantum cryptography on NVIDIA's DPUs.
- Delivered regular presentations on research progress and technical findings to a large team, receiving commendations for clarity and effectiveness.

Early stage researcher | *Universitat Politècnica de Catalunya* JUN 2022 - OCT 2022

- Investigating the applications of post-quantum cryptography in electronic voting.
- Developed and optimized Rust implementations of interactive protocols.
- Analyzed the impact of quantum computing on the security of lattice-based e-voting.

Skillset

Languages	***Fluent:*** Catalan	Spanish	English ***Beginner:*** Mandarin	Japanese
Programming Languages	***Experienced:*** Python ***Familiar:*** C	Java	R	Rust
Other Technologies	SQL	PostgreSQL	Power BI	regex	git	CPLEX	GECODE
Python Libraries	numpy	pandas	polars	selenium	tensorflow	sk-learn

Education

MSc in Mathematical Engineering | *U. Politècnica de Catalunya* FEB 2021 - JUN 2022

- Minor in Innovation and Research in Informatics (12 ECTS)
- Thesis: *Shorter secret keys in multivariate cryptography through optimal subspace representations* (Honors | report)

BSc in Mathematics | *Universitat de Barcelona* SEP 2016 - FEB 2021

- Minor in Computer Science (30 ECTS)
- Thesis: *An analysis of metric and topological estimators of generalization in deep learning* (9.4 | report | github)

Independent projects

Developed independently and presented in lieu of formal software industry experience.

Tatoebator (github) - Language learning tool for sentence-based Anki card generation. Includes automatic parsing, sentence retrieval, bilingual dictionary integration, and audio generation.

Technologies: SQLAlchemy, regex, ffmpeg, AnkiConnect, Flask

Resonant (github) - Music library analysis tool that extracts emotional embeddings from tracks and builds similarity-based playlists and graph structures. Includes web UI and REST API.

Technologies: TensorFlow, FastAPI, SQLAlchemy, h5py, D3.js

cps_sat (github) - CNF modeling toolkit with SAT-style constraints and solver integration.

Misc

Lengthy experience in teaching mathematics and computer science:

- As a freelance teacher, undergrad level (2017 - 2022)
- Voluntary mentor for high school olympiads (2019)

Participation in college-level math competitions:

- 1st place, Torneig de Tardor 2019
- 2nd place, Prova Santaló 2019
- Bronze medalist, International Mathematics Competition 2019