puljak.ema@gmail.com
linkedin/ema-puljak
github/emapuljak
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TECHNICAL SKILLS

Developed Python Package: tn4ml
(Tensor Networks for Machine Learning)
Software System Design and Deployment

Programming languages
Python, Julia, R

Scientific/ML packages
Jax, Pytorch, Quimb, Qibo, Qiskit
Tensorflow, Pennylane, MLFlow

Statistical analysis
Pandas, NumPy, scikit-learn, SciPy,
Matplotlib, Seaborn

Technical tools
Slurm Workload Manager,
DagsHub, CUDA, Git, Notion

Creative tools
Canva, Exalidraw, Keynote

SOFT SKILLS

- Able to adapt quickly to new technologies, algorithms, tools, and programming languages
- Thriving in fast paced environments
- Experienced in creating and presenting impactful educational content - presentations at over 10 conferences
- Excellent organizational, planning and communicational skills
  - Led a research project consisting of 6 people and distributed tasks
  - Supervised master student project
  - Mentored summer student at CERN
- Well versed in public speaking
  - Experienced in presenting at international conferences to technical and non-technical audiences
- Effective team player with significant experience in multidisciplinary collaboration

Languages

English (Proficient)
Spanish (Spoken)
French (Elementary)
Croatian (Native)

EMA PULJAK

QUANTUM-INSPIRED MACHINE LEARNING RESEARCHER

WORK EXPERIENCE

PhD Researcher
Quantum / Quantum-Inspired Machine Learning
CERN, Geneva
(10/2021 - now)

- **Tensor Networks for real-world applied Machine Learning problems**
  - Built tn4ml Python library for integration of Tensor Networks into Machine Learning [arxiv]
  - Designed and developed Tensor Network pipeline for cancer detection in CT lung scans
  - Implemented a Tensor Network for anomaly detection in the latent space of high-energy physics (HEP) events as a probabilistic model in continous data regime [arxiv]
    - showcased a potential of being deployed in real-time at the Large Hadron Collider (LHC)
  - Developed a Tensor Network model for classification in HEP to be deployed on FPGA
- **Quantum Clustering algorithms for anomaly detection in High-Energy Physics**
  - Implemented Quantum Kmedians clustering (comparable to classical algorithms) [nature]
  - Used Grover algorithm for finding cluster centers
  - Created a tutorial on Unsupervised Quantum Clustering in Qibo (tutorial)

Internship: Machine Learning for Particle Physics
CERN, Geneva
(03/2020 - 08/2021)

- Developed fast inference real-time Autencoder model for anomaly detection at the LHC
- Formulated pruning and dequantization strategies for neural networks to satisfy latency and resource constraints for model's deployment on the FPGA
- Responsible for organizing a hackathon attracting 50+ people [website]

Machine Learning Intern: Natural Language Processing
University of Zagreb
(11/2019 - 02/2020)

- Built Natural Language Processing models and annotated in-house datasets to develop a software for analysis and filtering of targeted CVs (curriculum vitae)

EDUCATION

Universitat Autònoma de Barcelona (Spain)
Doctoral degree in Physics (July 2025)

- Thesis: Quantum and Quantum-Inspired Applied Machine Learning: Applications in High-Energy Physics and Medical Imaging

University of Zagreb (Croatia)
Master (2021) and **Bachelor** (2018) in **Computer Science**

- Thesis: Anomaly detection with Autoencoders at the Large Hadron Collider at CERN

CONFERENCES / TALKS

- Showcased a poster at Quantum Techniques in Machine Learning in Australia (2024)
  - Quantum-Inspired Tensor Networks for unsupervised and supervised cancer detection in medical imaging
- Prepared and delivered a 2hr lecture talk at University of Zurich
  - Introduction to Quantum Machine Learning and Tensor Networks
  - How Tensor Networks connect Quantum and Classical Machine Learning
- Prepared and lectured at CERN Summer School Lecture series
  - Basics of Quantum Computing (talk and slides)
  - Introduction to Tensor Networks (talk, slides, tutorial)
- The Role of Quantum Computing in shaping the future of Machine Learning
- Quantum Computing: technology that will change the world (talk, slides)
- Presented a poster at International Quantum Tensor Network Conference (Flatiron Institute, New York City, USA) [poster]

HOBBY | Cooking and designing recipes for Quantum Cooking website [quantum.cooking]