# Eric Alcaide Medicine & Physics Student, Machine Learning

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## Skills

**Multi-Language Coding**
Python, Julia, Bash, JavaScript, C++, Web, Scientific computing, Numerical computing frameworks (TensorFlow, Pytorch, Numba, etc)

**Cloud & HPC**
Algorithmic optimization, CPU and GPU parallelism, server and cluster computing

**Machine Learning**
Geometric deep learning, computer vision, natural language, clustering, graphs, self-supervised learning, etc

**Teamwork, Public Speaking, Fast Prototyping, Problem Solving**

## Professional / Research Experience

09/2021 – present
**Translational Scientist,** *CHARM Therapeutics*
From Bits to Molecules
Everything in between: geometric deep learning research, model evaluation, target research, data pipeline engineering, virtual screening, etc.

01/2021 – present
**Open Source Researcher,** *EleutherAI, OpenBioML*
Research at the intersection of Natural Language Processing, Structural Biology and High-Performance Computational Methods.

12/2020 – 01/2022
**Machine Learning Researcher,** *VIR Biotechnology*
Research in Machine Learning for Structural Biology. Geometric Deep Learning and Natural Language Processing techniques for organic molecules, proteins and monoclonal Antibodies (mAbs).

2019 – 2021
**Private Machine Learning Tutor**
Personalized advice to Masters' students from different backgrounds (from Computational Linguistics to Biomedical Engineering) on Text Classification, Image processing and Information representation. Advised how to carry out Masters' Thesis-level projects.

2019
**Non-Profit Health Hackathon Mentor,** *TV3 - La Marató*
Advised and assisted teams developing healthcare and scientific projects with a strong algorithmic component, including genetic clustering and protein conformational changes.

## Papers & PrePrints

2023
**RWKV: Reinventing RNNs for the Transformer Era,** *Arxiv*
A new architecture, similar performance to Transformers but better efficiency. Trained multilingula Large Language Models from 0.1B to 14B parameters, with chat interface.

2023
**Advancing structural biology through breakthroughs in AI,**
*Current Opinion in Structural Biology*
Major recent advances driven by technology and potential applications to novel therapeutics.

2022
**Relevance of myocardial injury biomarkers to the prognosis of COVID-19 patients,**
*Revista Española de Cardiología*
COVID19 related revision of predictive power of myocardial injury biomarkers (NT-proBNP and hs-TnT) regarding Mechanical Ventilation and Deatch Events.

2021
**MP-NeRF: Massively Parallel Natural Extension of Reference Frame,**
*Journal of Computational Chemistry*
Massively Parallel version of the Natural Extension of Reference Frame for folding polymers (proteins, RNA, ...) based on internal angles. Achieved 1000x speedups against previous state of the art. Usage in MD simulations and Machine Learning training.

2018
**E-swish: Adjusting Activations to Different Network Depths,** *ArXiv*
PrePrint proposing a new activation function called E-Swish which showed state of the art results in several computer vision benchmarks.

## Education

09/2020 – 06/2024
Barcelona, Spain

**Physics Degree,** *University of Barcelona*
Physics Degree

09/2018 – 06/2024
Barcelona, Spain

**Medical Degree,** *University of Barcelona*
Medical Degree. Multiple distinctions.

## Courses

2020 – 2020
Barcelona, Spain

**HPC-based Computational Biomedicine,** *Barcelona Supercomputing Centre*
Impact and Hands-on experience of applied supercomputing to biomedical problems (molecular simulations, genomic analysis, tissue modelling, etc.)

2018 – 2019

**Deep Learning, Natural Language Processing and AI for Medicine Specializations,** *Coursera*
Contents include: foundations of Deep Learning, project management, Computer Vision, sequential data, Natual Language Processing, AI in healthcare, etc

01/2017 – 05/2017

**Artificial Intelligence Micromasters Program,** *Columbia University*
CSMM.101x: Artificial Intelligence (AI) - (through edx.org). Average qualification: 8.1 / 10
Search methods, games, ML introduction, CSPs, NLP, robotics introduction, etc.

## Projects

2018 – present

**Open Source projects**
Projects and modules for scientific computing which recieved a high degree of community acceptance:

- **2021: AlphaFold2 open replication :** Main contributor to the Open Source effort for the replication (and improvement) of the AlphaFold2 architecture (state of the art, deep learning engine for protein structure prediction).
- **2021: Geometric Vector Perceptron :** Implementation of a Graph Neural Network architecture capable of handling 3D geometry.
- **2021: E(n) Equivariant GNN:** Graph Neural Network architecture which works on invariant representations in arbitrary dimensions.
- **2019: MiniFold**: Predict protein foldings from raw sequences (AlphaFold v1 imitation).
- **2018: Keras-WRN:** A package of Wide Residual Networks for image recognition in Keras.

**Open Source Contributions**
Contributions to cutting-edge Open Source Software packages (Pytorch Geometric, Fastformers, etc)

2017

**Deep Learning - Can Computers Learn?**
Research project focused on the AI and Deep Learning field, subfields and the state of the art techniques.

- Evolutionary Strategies for architecture optimization in Neural Networks.

## Languages

**Spanish**
Native

**Catalan**
Native

**English**
C2 level

**German**
B1 level

**Mandarin**
HSK 1-2 level

## Awards

2019

**ESADE - Accenture HealthHackathon Winnner Award,** *ESADE, Barcelona*

2019

**AlphaFold v1 Replication Contest Award, Nvidia Titan RTX,** *Nvidia*

2017

**Hackathon UPC Winner Award,** *HackUPC, Barcelona*