ALEXANDRU DUMITRESCU

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ACADEMIC BACKGROUND

Doctoral Researcher

Aalto University, Computational Systems Biology **in collaboration with Helsinki University,** Helsinki Institute of Life Science

04/2021 – Present

> Research exchange: Broad Institute of MIT and Harvard. (02/2024-08/2024)
> Collaboration: HiLIFE, University of Helsinki (04/2021-12/2023)

M.Sc. in Machine Learning, Data Science and Artificial Intelligence

Aalto University

08/2018 – 04/2021

B.Eng. in Computer System Engineering

Politehnica University of Bucharest

09/2014 – 07/2018

PUBLICATIONS

> E(3)-equivariant models cannot learn chirality: Field-based molecular generation. (ICLR 2025)
> TSignal: a transformer model for signal peptide prediction. (ISMB conference, published in Bioinformatics, 2023)
> Structure-guided T cell receptor and epitope interaction prediction. (ICML CompBio Workshop 2023)
> TCRconv: predicting recognition between T cell receptors and epitopes using contextualized motifs. (Bioinformatics 2023)
> EPIC-TRACE: predicting TCR binding to unseen epitopes using attention and contextualized embeddings (Bioinformatics 2023)
> "TCR Sequence Representations Using Deep, Contextualized Language Models". (M.Sc. Thesis, 2021)

ONGOING PROJECTS

> Generalized binding prediction of peptide-MHCII: a citrullination case study. Peptide-MHC binding prediction methods for post-translationally modified peptides utilizing chemical features of amino acids.

OTHER PROJECTS

> Hyperbolic discounting reinforcement learning: Off policy methods with hyperbolically discounted future rewards.
> Graph Clustering: Clustering binary graphs using spectral clustering methods.
> WimblePong: Reinforcement learning project for the Atari Pong game on pixel space.
> Bayesian Demographic Prediction: Probabilistic hierarchical models with MCMC inference.
> String Embedding: Non-contextualized word embeddings (Skip-gram, CBOW, GloVe).

WORK EXPERIENCE

Research assistant

Aalto University

03/2020 – 03/2021 Espoo, Finland

> Language models for T cell receptors.

AI developer

IPRally Technologies Oy

03/2019 – 02/2020 Helsinki, Finland

> Deep learning methods for a patent search engine based on graph representations of patents.

SKILLS

Libraries: PyTorch, Scikit-learn, NumPy, Pandas, Matplotlib, Jax, Keras, Tensorflow, PyStan

Technologies: Linux, git

Languages: Python, Julia, C

ML knowledge: Deep Learning, Generative Models (Diffusion, Flow matching, Autoregressive, VAE) Probabilistic Models, Data Mining, Reinforcement Learning

FREE TIME

I enjoy reading, playing chess, and climbing.