



ANDREI_NICA

Bucharest, Romania

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Anticipating my Ph.D. completion at UPB in Summer 2023 under the supervision of Adina Florea, my research currently centers on exploration in Reinforcement Learning (RL) with active research in intrinsic reward and drug discovery. Concurrently, I lead Machine Learning research and production at a dynamic startup, delivering real-time analytics from video streams. In addition, I recently extended my research experience as a Visiting Research Student at Mila - Quebec AI Institute / Université de Montréal, focusing on utilizing machine learning algorithms for drug discovery, mentored by Yoshua Bengio. Before this, I completed a Graduate Research Trainee program at McGill University, studying exploration in RL under the guidance of Doina Precup. My comprehensive research history and professional engagements mark me as a committed and seasoned expert in the Machine Learning field.

MENTIONABLE RECENT RESEARCH

Machine learning for drug discovery, 2021 - Present

Researched and applied various machine learning algorithms, including reinforcement learning, diffusion models, and generative flow networks, to enhance large-scale, de-novo drug design. Conducted exploratory tasks for both small molecule and protein sequence generation. Evaluated the generalization of a generative algorithm in small molecule design, focusing on metrics predictive of desired search performance. ([Nica et al. 2022](#), [Madan et al. 2023](#)).

The order from time as intrinsic reward for exploration, 2022

I investigated the premise that a reinforcement learning agent can enhance its exploration capabilities when the resulting trajectories exhibit low entropy, taking into account all possible permutations of the observations. I analyze how predicting the maximum (learnable) likelihood of the correct order of a sequence of observations can serve as an intrinsic reward signal for the agent. ([Nica et al. 2023](#))

Affordance aware temporal abstractions, 2021

Researched a model-free algorithm to learn options online which have an explicit understanding of affordances associated with the features of the world. We characterized affordances as a hard-attention mechanism in hierarchical RL and investigated the role of hard versus soft attention in different scenarios, empirically demonstrating the "paradox of choice". ([Nica et al. 2021](#))

Inductive bias and Generalization in Reinforcement learning, 2020

Examined the challenge of generalization in RL, specifically focusing on variations within the same Markov Decision Process (MDP). My research explored how this issue arises during the evaluation process and identifies key factors influencing performance.

2018 - 2019: Semantically aware exploration for indoor robot navigation (Pepper Robot) | Car control from self supervised car path prediction (path segmentation) | Transfer end-to-end steering network trained on a large-scale driving database (BDD100k) to local dataset (UPB) | Improve UPB Map-Based localization using road and lane marking detection in multiple-camera setup | Research on better exploration methods in reinforcement learning, using intrinsic reward | A hierarchical approach to curiosity driven learning.

EMPLOYMENT HISTORY

Lead AI/ML researcher, HUDStats

MAY 2022 – PRESENT

Research and development of a multi-model ML framework for generating live statistics from eSports video streams. For training models we use both supervised and reinforcement learning algorithms. Development and deployment of a semi-automatic Machine learning pipeline (from data gathering & active learning to deployment of a hierarchy of models in production). hudstats.com

Visiting Research Student (Internship) , Université de Montréal , Montréal

MARCH 2021 – APRIL 2022

Research Machine learning algorithms for drug discovery. The goal of the research project was to find algorithms that can quickly find significantly better drug candidates, to learn interesting biological insights, and create a bridge between AI and medical experts. Internship under the supervision of Yoshua Bengio.

Nemodrive - Product Manager, Lead Researcher, Politehnica University of Bucharest, Bucharest

JANUARY 2018 – DECEMBER 2019

Defined and led 3 main Machine Learning research directions. Managed teams of 3 to 9 people. Managed the project objective of building and deploying a level 4 self-driving prototype in the University Campus. The team's main responsibilities included integrating the following: an open-source self-driving framework, autonomous car sensors, processing equipment, deep learning vision modules, conduct research on machine learning solutions to train and deliver an end to end control model. nemodrive.cs.pub.ro

Research Assistant, Politehnica University of Bucharest, Bucharest

DECEMBER 2015 – JUNE 2020

Supervised 3 interns, 5 Bachelor thesis and 5 Master thesis on Machine learning topics (Reinforcement learning and Vision). Designed and delivered an advanced course on Self-Driving Cars (Nov 2019) - part of a mandatory course for the Artificial intelligence Master's program. Worked on 3 robotics with AI research projects and 1 project focused on semantic text analysis.

Co-founder & Researcher, Visimote

FEBRUARY 2018 – MARCH 2021

Research and development of a robust and viable software algorithm for hand detection and tracking from 2D video stream. Capabilities include: CPU real-time processing of 720p resolution stream; effective range up to 7 m in bright light and up to 4 m in very low light using standard web camera. visimote.com

Game Developer, Goob Games, Bucharest

FEBRUARY 2015 – AUGUST 2015

Full software mobile game development. Multilevel arcade/battle mobile games published on Google Play, iTunes, Amazon.

Business Development Manager, Selentric Group, Bucharest

MARCH 2014 – AUGUST 2014

Responsible with acquiring new affiliates, managing existing campaigns, market data analysis and consulting on how to enter new markets.

EDUCATION

Graduate Research Trainee Program, McGill University, Montreal

JANUARY 2020 – JANUARY 2021

Reinforcement learning research under the supervision of Professor Doina Precup.

Doctor of Philosophy (PhD), Computer Science, University POLITEHNICA of Bucharest

SEPTEMBER 2015 – PRESENT

Thesis subjects: Exploration in Reinforcement learning. Intrinsic rewards. Multi-agent communication.

Research domains: Machine Learning, Neural Networks, Reinforcement learning, Multi-agent systems.

Master of Science (MSc), Management in Information Technology , Faculty of Automatic Control and Computers, Politehnica University of Bucharest, Bucharest

SEPTEMBER 2013 – SEPTEMBER 2015

Thesis title: "Knowledge transfer in Machine Learning".

Bachelor's degree, Computer Science, Faculty of Automatic Control and Computers, Politehnica University of Bucharest, Bucharest

SEPTEMBER 2009 – JUNE 2013

Activities and Societies: Vice-President of The Students' Society of the Faculty of Automatic Control and Computers (LSAC); Member of the Faculty Council; Member of the University Senate.

PUBLICATIONS

Nica et al. "Order from Chaos: Leveraging the Order in Time as Intrinsic Reward", CSCS24, 2023, [\[link\]](#)

Madan et al. "Learning GFlowNets from partial episodes for improved convergence and stability", ICML, 2023, [\[link\]](#)

Nica et al. "Evaluating Generalization in GFlowNets for Molecule Design", MLDD workshop ICLR, 2022, [\[link\]](#)

Nica et al. "The Paradox of Choice: Using Attention in Hierarchical Reinforcement Learning", 2021, [\[link\]](#)

Mihalea et al. "End-to-end models for self-driving cars on UPB campus roads", ICCP, 2019, [\[link\]](#)

Nica et al. "Collecting and processing a self-driving dataset in the UPB campus", CSCS22, 2019, [\[link\]](#)

Nica et al. "Learning to Maximize Return in a Stag Hunt Collaborative Scenario through Deep Reinforcement Learning", SYNASC, 2017 & Reinforcement workshop ICML 2017, [\[link\]](#)

COURSES, HONOR & AWARDS

International Summer School on Deep Learning, Bilbao (Jul, 2017)

Microsoft AI Summer School, Cambridge (Jul, 2017)

The Malmo Collaborative AI Challenge Award - Microsoft Research, Cambridge (Jun, 2017)

EXTRA-CURRICULAR ACTIVITIES

Social Impact Award Romania - Project Manager at Impact Hub Bucharest (Oct, 2013 - Jun, 2014)

Social Impact Award is an education program and an international competition which supports social entrepreneurship, independently organized at a local level.

Core team, Logistics & Operations Manager at TEDxBucharest (Jul, 2011 - Nov, 2015) TEDxBucharest is an independently and locally organised TEDx event.

Co-Founder, Vice President at Incub Association (NGO) (Jul, 2011 - Nov, 2015) Incub focuses on organizing events and projects that bring positive value in society (at the cross-point of science, art, culture, technology and design).

LINKS

www.linkedin.com/in/andreicnica <https://github.com/andreicnica>