

Alexandru-Ilie Știrbu

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EDUCATION

University "Alexandru Ioan Cuza" - Iasi, Romania

Master Degree in research on Artificial Intelligence

Sep 2021 - Jun 2023

ECTS Mean: 9.70 / 10.00

University "Alexandru Ioan Cuza" - Iasi, Romania

Bachelor Degree in Computer Science

Sep 2018 - Jun 2021

ECTS Mean: 9.50 / 10.00

THESIS

Master: Researched a new Multi-Input Perceiver Neural Network model, based on the [Perceiver](#) paper, for handling multiple inputs of same or different modalities. Compared both models on 3 tasks: Protein Binding / Protein Affinity Ranking / MELD and demonstrated that the proposed architecture yielded better results than the original architecture.

Mark: 10.00 / 10.00

Bachelor: Researched up-scaling the resolution of Images. Trained different Vision Neural Networks that received the down-scaled image as input and needed to recreate the original image. Demonstrated that the models performed better than standard algorithms in terms of Structural Similarity Index Measure (SSIM) and Peak Signal-to-Noise Ratio (PSNR).

Mark: 10.00 / 10.00

EXPERIENCE

Senior AI Scientist | Ordaos Bio - New York, USA - Remote

Nov 2021 - Present

Conducted advanced research on cutting-edge Neural Networks to predict the interaction dynamics between two proteins, specifically focusing on their binding propensity and affinity. Implemented a comprehensive approach by integrating Amino Acid Sequences and 3D Structures, alongside other computed features, to construct a graph representation. Additionally, incorporated simulated docking procedures to enhance the accuracy of protein interaction predictions.

Conducted extensive research on the optimization of fast rigid docking through the application of Genetic Algorithms, aimed at achieving rapid and efficient simulations.

Contributed to the development of the Reinforcement Learning Loop / Optimization Loop for the generation of De Novo binder proteins. Implemented a system wherein continuous evaluations of the designed binders' properties were performed by Neural Networks, with the overarching objective of optimizing and maximizing the obtained scores.

Developed an innovative tool designed for the inpainting of lacunae within the 3D structure of proteins, employing an advanced Diffusion Model. The efficacy of this tool surpasses that of the PDB Fixer, enhancing the precision and completeness of protein structures.

Directed a dynamic research team specializing in Continual Active Learning, with a primary focus on the seamless assimilation of continuously emerging data pertaining to diverse binders and targets. Spearheaded successful initiatives employing Most Interfered Retrieval techniques, strategically identifying and prioritizing data elements prone to be forgotten, thus ensuring perpetual model learning while preserving previously acquired knowledge.

Machine Learning Engineer | Soleadify - Bucharest, Romania

Sep 2021 - Nov 2021

Led initiatives focused on the integration and deployment of cutting-edge Machine Learning Models to facilitate automated data-scraping for diverse products across various websites. Expertly fine-tuned advanced Transformer models, enhancing their predictive capabilities for extracting essential product properties. Innovatively leveraged Dragnet to streamline input by automatically reducing boilerplate content. Additionally, engineered modifications to Dragnet to enable highly efficient multi-processing training, maximizing utilization across all available cores.

Software Engineer I | Bentley Systems - Iasi, Romania - Remote

Mar 2021 - Sep 2021

As a key contributor, my primary role involved the conceptualization and implementation of advanced algorithms in both C++ and C# to address diverse 3D geometry challenges. I spearheaded the development of critical features for the innovative Open Tunnel Modeler product, focusing on the creation of efficient, essential algorithms. Additionally, I optimized existing algorithms to elevate product performance, ensuring a high-quality deliverable tailored to the needs of Civil Engineers.

PROJECTS

Just Monika LLM

Summer 2024

Developed a local LLM pipeline using Gemma 2B to create an AI for Monika, the character from DDLC, which can chat with the player in an visual-novel environment resembling the original game, created with PyGame. Used prompt engineering to induce the character role-play and to self-analyze the mood of the conversation, in order to auto-update the sprites.

Vision Models Playground

Spring 2022 - Present

Vision Models Playground represents a Python Package accessible through PyPi, showcasing my proficiency in developing a diverse range of vision AI models. These models are meticulously crafted in PyTorch, featuring comprehensive implementations and accompanied by pre-trained weights for select ones. The package facilitates seamless integration with HuggingFace and incorporates various general AI enhancements for an elevated user experience

Rock Paper Scissors via Webcam

Spring 2022

Developed and implemented a Vision Transformer from scratch using PyTorch, undertaking comprehensive training on a rock-paper-scissors dataset. Integrated the trained model into a larger application, facilitating a two-player engagement within a lobby through webcam-based interactions for a Rock-Paper-Scissors game. Executed training operations using PyTorch Lightning, and to establish performance benchmarks, conducted comparative training with VGG19 and ResNet50 models within the realm of Deep Learning. Additionally, explored classical Machine Learning methodologies, incorporating feature matching and SVM approaches.

StarCraft II - Zerg AI

Spring 2020

Developed a StarCraft II Zerg AI in Python, leveraging Burny's SC2 API, consistently outperforming official Elite AIs across all classes and occasionally achieving victory against official Cheater Elite AIs. This AI exhibits strategic prowess in optimal decision-making for the construction of structures, upgrades, and units, tailored to counter the adversary's strategy and adapt to the dynamic environment. Each controlled unit demonstrates peak efficiency through judicious use of abilities, strategic movement, and tactical decision-making to maximize longevity and damage output. Employing pre-evaluation algorithms, the AI strategically chooses to engage or retreat in every impending encounter based on a thorough assessment of its likelihood of success.

Water World - Deep Q-Network

Winter 2020

Water World is a molecular-based game where players consume green molecules while avoiding red ones. This project showcases a Deep Q-Network AI implemented in Python, adept at learning optimal gameplay solely through the current score and its vision sensors. The game was meticulously reconstructed in Python using PyGame, featuring a Neural Network that processes sensor data from the current frame to determine the optimal movement direction. The learning process is facilitated by an internal buffer, allowing the AI to extract crucial information for specific frames and refine its decision-making based on prior choices.

SKILLS

Languages: Python, C/C++, Java, C#, SQL

Knowledge: Artificial Intelligence, Math, Genetic Algorithms, Data Structures, Graph Theory, Object Oriented Programming, Algorithms, Game Tactics, Computer Graphics, Databases, Probabilities

ACADEMIC AWARDS

Cloudflight Coding Contest - AI Section

Nov 2022

1st place globally

MO-Ariel - International Mathematical Olympiad Championship (Team)

Jan 2022

1st place globally, gold award

Jane Street Estimathon

Oct 2021

1st place globally, gold award

Open Mathematical Olympiad for University Students

May 2021

25th place globally, bronze award

MO-Ariel - International Mathematical Olympiad Championship (Individual)

Dec 2020

8th place globally, gold award

HashCode - International Google's Coding Competitions

Feb 2020

1st place in Iași, 13th in Romania, 265th globally (top 2.47%)