Tamás Takács PhD Student (Artificial Intelligence)

I am currently pursuing a PhD in Artificial Intelligence at Eötvös Loránd University. My professional experience includes two years in the AI industry, focusing on deep learning, natural language processing and computer vision technologies aimed at automation. I have two years of research experience with publications on GNNs in medical diagnostics and Multi-Agent Reinforcement Learning. I teach Deep Learning, Game Theory, and Agent-based Modeling at the faculty while researching Machine Unlearning techniques applicable in the fields of RL, NLP, and Computer Vision.



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• Budapest, HU

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Work Experience

Research Assistant 🐼

<u>Apollo 2028</u>

2024/09 - Present

Budapest, HU

ELTE

- Currently researching the integration of Machine Learning and Reinforcement Learning models into Agent-Based Models (ABM).
- Developing AI decision support tools based on ABMs for upper management in healthcare facilities to help reduce individual stress and increase wellbeing.
- Addressing critical issues of mental health and resilience among healthcare professionals.
- Supporting gualitative and guantitative data analysis using statistical and interpretability tools such as SHAP, linear models, decision trees, and feature importance techniques.

Assistant Lecturer

Teaching Materials

2024/09 - Present

ELTE

Budapest, HU

- Currently teaching two university courses at the Department of Artificial Intelligence and contributing to the development of another:
 - Deep Network Developments: Responsible for practice classes, practice materials, assignment and exam creation.
 - Collective Intelligence: Responsible for practice classes, practice materials, and assignments.
 - Game Theory: Leading course development, and revising old class materials.

Academic Coordinator, Mentor

<u>Hungarian National AI Olympiad</u>

<u>R&D Engineer</u> 💊

Swabber

2024/09 - Present

- Designed and implemented an agent-based model (ABM) using the Mesa framework in Python to simulate the transmission dynamics of common STIs in multi-agent populations, supporting research testing into strategies and behavioral interventions.
- Developed a behavioral scoring system to assess user activity within STI networks, encouraging responsible practices, such as regular testing, open communication, and treatment-through educational content and app-based support.

AI Backend Engineer O HUNGARIAN STARTUP

<u>LifeSync Pro - Incubator</u>

2024/02 - 2024/09 (7 months)

Budapest, HU

- As a past participant in the Hungarian Startup University Program, I contributed to ethical considerations and the governance of AI in healthcare. Additionally, I am involved in engineering healthcare information systems (HIS) compatible tools.
- Worked on a baseline for a summarization system for medical anamnesis in Hungarian hospital emergency rooms (GraphRAG).

Deep Learning Intern BOSCH

Robert Bosch Kft.

2022/03 - 2023/02 (1 year)

Budapest, HU

• Helped improve the company's Adaptive Cruise Control (ACC) system by using deep learning tech

Budapest, HU

ELTE

2024/09 - Present

Budapest, HU

- Coordinate national qualifier rounds and serve as a primary liaison for student communication and logistics.
- Design and develop a wide range of competition materials, including programming and scientific exercises for our national qualifier rounds.
- Create and review tasks covering LLM prompting, classical NLP tools, quizzes, and hands-on NLP and computer vision challenges.
- Support the organization of summer camps and manage student travel arrangements for international competitions.
- Example exercise: <u>Google Colab</u>

to create an auto-labeling method. This approach utilized object tracking, depth estimation, and object detection techniques to improve accuracy and reduce the costs associated with manual labeling.

- Worked on a single dashboard camera that was cost-efficient and computationally effective in calculating different actions of the target vehicle.
- Throughout the development process, I worked closely with the labeling teams, as well as the validation and development teams, to define and test the required cruise control actions in diverse scenarios.

Software Engineer Intern

<u>NI Hungary Kft.</u>

2020/05 - 2020/09 (3 months)

Debrecen, HU

- Undertook the development of a web application that facilitated seamless communication with the company's dedicated services designed for testing a wide range of devices on-site.
- Integrated this application as a plugin within a comprehensive test monitoring software. То achieve this, I extensively utilized the Angular framework to conduct thorough research, establish a proof of concept, implement the application, and conduct rigorous testing.

Education

ELTE <u>Eötvös Loránd University</u>

- Artificial Intelligence (PhD)
- Artificial Intelligence (MSc) 2022/09 - 2024/07

University of Debrecen 横

- Computer Science (BSc)
- 2018/09 2022/01

2024/09 - Present

Publications

Scalable Distributed

Reinforcement Learning in

OTDK <u>Multi-Agent Environments</u>

ELTE - TDK 1st Place -> OTDK 2nd Place GitHub

- I have studied the scalability and compatibility capabilities of state-of-the-art reinforcement learning algorithms in multi-agent environments, showing that they are typically optimized for single-agent environments.
- Addressed the complexities of managing dynamic populous multi-agent environments and by implementing a single-brain monolithic method as baseline, utilizing global observations, α rewards, and trajectories.
- Developed a hybrid model that integrates local observations with a distributed reward system and a trajectory separation technique, tripling training speed compared to initial attempts.
- Reduced the model size by a factor of 30 compared best reinforcement learnina to the deep submission in the competition.

Skills

Technical Skills

- Programming Languages: Python (Proficient), JS/TS (Experienced), C++ (Familiar)
- AI Frameworks: PyTorch, TorchRL Tensorflow, Keras, NumPy, Jax, Pandas, Scikit-learn, Seaborn
- Cloud Platforms: AWS, Azure, Google Cloud
- Project Management: Agile, Kanban, Git
- MLOps: CI/CD procedures, GitHub Actions, TF-KubeFlow, ETL Serving, Docker, Kubernetes, Pipelines, AWS Glue, Amazon SageMaker, GCloud AutoML
- Platforms: Windows, Linux, macOS
- Additional: Ethics and Governance of AI, AI Alignment

Soft Skills

Demonstrator (B) ELTE

2023/09 - 2024/07 (10 months) Budapest, HU

Deep Network Developments

• Developed homework assignments and exams and conducted oral defenses to evaluate student performance.

Game Theory

• Worked lesson on updating the topics, incorporating coding examples and improving the course material.

<u>Demonstrator</u>

UNIDEB

Debrecen, HU

ELTE

2021/02 - 2022/01 (11 months)

- C Programming
- Created a tailored coding curriculum with interactive exercises and challenging C coding assignments to enhance students' coding skills.
- Developed a specialized assignment that taught students the basics of socket programming.

Certificates

• A selection of my professional and semiprofessional certifications, including courses from Coursera and Udemy, as well as recognitions from hackathons, competitions, and research institutes—can be found on my LinkedIn profile.

Hackatons

linh

• Streamlined the training processes, which made my model learn basic environmental skills 24 times faster, using 600 times less training data.

Graph Embedding Algorithms UNIDEB - TDK 2nd place -> OTDK



- The focus of my research work was to demonstrate the advancements and potential applications of algorithms embedding in smart-city graph environments.
- Developed a taxonomy of novel graph embedding algorithms and demonstrated their effectiveness across datasets with varying domains.
- Showed that employing ensemble systems in various domains, enhances generalization capabilities by 5% on average across all algorithms.



Lablab.AI

- I managed a small team to develop an AI-based Scrum bot aimed at streamlining communication with customers within the IT industry.
- I implemented a custom pipeline utilizing the OpenAI API to summarize emails received through a corporate email service, automatically generating Jira tickets with assigned tasks and deadlines.
- I solely utilized n8n.io to create a proof of concept (POC) for the project.
- The project concept earned acceptance into an international incubator program based in Germany.

Byborg AI Hackaton Byborg

2025

Byborg

- Selected as team lead for a competitive 24-hour hackathon hosted by Byborg Enterprises.
- Led the development of an interactive storytelling game powered by a pipeline of multimodal AI models.
- The application enabled users to interact with the environment in a panmodal way, generating visual assets, integrating them into a dynamic scene, and co-narrating a story alongside the user.

Competitions

<u>Országos IT</u> <u>Megmérettetés (PBs)</u>



- Artificial Intelligence 8th
- AWS Fundamentals 23rd
- Azure Cloud 14th
- Data Engineering 41st
- Data Science 1st
- DevOps 40th
- Kubernetes 46th
- Language Independent Programming 60th
- Large Language Models 19th
- Python 20th

LuxAI Season 2 (Kaggle) kaggle

• I developed a multi-agent reinforcement learning (MARL) solution using Python and Stable Baselines3, securing 18th place in the competition.

2024

Languages

- English Fluent (C1)
- Romanian Fluent (C1)
- Russian Al
- Hungarian Native

