Ignacy Stepka

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Education

Poznan University of Technology — **October 2020 – September 2022**
Computer Science | GPA: 4.59 (2-5 scale) — Poznan, Poland
– transferred to AI major after the 2nd year

Poznan University of Technology — **October 2022 – (expected) March 2025**
Artificial Intelligence | GPA: 4.78 — Poznan, Poland

Skills

Technical: Python · C++ · C# · SQL · Git · Slurm · Linux · PyTorch · Wandb · Scikit-learn · Pandas · Numpy · ROS · Docker

Languages: Polish (native) · English (TOEFL 108/120 C1) · Spanish (learning)

Domain-relevant coursework: Calculus (I,II) · Linear algebra · Discrete Mathematics · Computational Logic · Convex Optimization · Statistics and data analysis · Machine Learning · Artificial Intelligence · Information Theory · Data Mining

Engineering-relevant coursework: Low-level Programming · Database Systems· Computer Architecture · Computer Networks · Concurrency Programming · Software Engineering · Objective Programming · Operating Systems · Robotics (I,II)

Experience

Research Intern — **June 2023 – present**
Carnegie Mellon University | Robotics Institute — Pittsburgh PA, USA
AutonLab | Supervised by Prof. Artur Dubrawski

- 2x Robotics Institute Summer Scholar, a highly selective summer REU program, both times continued the collaboration remotely.
- Researched the resilience of decentralized learning algorithms in adverse environments under data heterogenity.
- Designed a method to restore the knowledge of a device lost during the optimization process via a model-inversion attack.
- Developed a formal verification approach for Bayesian Networks enabling rigorous model testing and validation. (published)

Research Assistant — **November 2022 – present**
Poznan University of Technology — Poznan, Poland
Machine Learning Laboratory | Supervised by Prof. Jerzy Stefanowski and Dr. Mateusz Lango

- Conducted research in explainability techniques, focusing on counterfactual explanations, as part of the TAILOR EU network.
- Introduced a method generating counterfactual explanations that are probabilistically robust under model shifts. (published)
- Developed a novel user-centric counterfactual explanation method based on a multi-criteria ensemble analysis. (published x2)

Machine Learning Engineer — **August 2021 – May 2024**
Poznan Supercomputing and Networking Center | Polish Academy of Science — Poznan, Poland

- Individually contributed to deliverables in 3 distinct EU HORIZON funded projects:

Anomaly detection projects – ADMIRE, SHOP4CF (20 months)

- Investigated anomaly detection techniques for HPC centers in order to detect early faults and prevent server failures.
- Designed and implemented an MVP, which later served as a base for further development of the final solution.
- Prepared models for deployment and build the interface app for deployment in the factory of a large car manufacturer.

Explainable AI project – TAPAS (6 months)

- Analyzed the behavior of a black-box model in a multi-agent scenario setting, employing various XAI techniques.
- Found critical vulnerabilities in the decision-making process and made the team modify their approach.

Internship – position granted by winning Intel AI4Y program (3 months)

- Analyzed how different pre-processing techniques impact the performance of the UNet model in medical imaging.

Junior C# Developer — **February 2021 – July 2021**
ProCat — Poznan, Poland

- Built new modules for automated product catalog generation in a large product information management (PIM) system.

Scientific output

Publications

- **Ignacy Stepka**, Mateusz Lango, Jerzy Stefanowski – *"Counterfactual Explanations with Probabilistic Guarantees on their Robustness to Model Change"* – accepted for 31st SIGKDD Conference on Knowledge Discovery and Data Mining - Research Track (August 2024 deadline), August 2025, Toronto (Core A*)
- **Ignacy Stepka**, Nicholas Gisolfi, Artur Dubrawski – *"A SAT-based approach to rigorous verification of Bayesian networks"* – Workshop on Explainable and Robust AI for Industry 4.0 & 5.0 (X-RAI) @ Joint European Conference on Machine Learning and Knowledge Discovery in Databases (ECML PKDD), September 2024, Vilnus (Core A). Oral presentation.
- **Ignacy Stepka**, Mateusz Lango, Jerzy Stefanowski – *"A multi-criteria approach for selecting an explanation from the set of counterfactuals produced by an ensemble of explainers"* – International Journal of Applied Mathematics and Computer Science (AMCS), March 2024
- **Ignacy Stepka**, Mateusz Lango, Jerzy Stefanowski – *"On usefulness of dominance relation for selecting counterfactuals from the ensemble of explainers"* – Proceedings of the 4th Polish Conference on Artificial Intelligence, September 2023, Lodz

Posters (non-archival)

- Lukasz Sztukiewicz, **Ignacy Stepka**, Michal Wilinski, Jerzy Stefanowski – *"Enchancing Fairness in Neural Networks with Debiasing Techniques"* – ML in PL conference, Warsaw, Poland 2024
- **Ignacy Stepka**, Kacper Trebacz, Nicholas Gisolfi, James K. Miller, Artur Dubrawski – *"Adaptive Fill-in: How to Mitigate the Loss of an Agent in Decentralized Federated Learning"* – ML in PL conference, Warsaw, Poland 2024
- Szymon Rusiecki, Michał Wilinski, **Ignacy Stepka**, Cecilia M. Garza, Kimberly Elenberg, Luke Sciulli, Kyle Miller, Artur Dubrawski – *"Bayesian Network for Prediction of Vital Functions by Autonomous Triage"* – ML in PL conference, Warsaw, Poland 2024
- Michal Wilinski, Lukasz Sztukiewicz, **Ignacy Stepka**, Wojciech Maczka, Dariusz Brzezinski – *"FOSILS: FrOm SmILes to Stars - an end-to-end workflow for estimating the capacitance of new battery materials"* – GHOST Day: Applied Machine Learning Conference, Poznan, Poland 2024

Leadership and service

Seminar group leader in Student Research Group — **January 2021 – present**
Poznan University of Technology — Poznan, Poland

- Led of the "eXplainable AI seminar" (2023) and "Machine Unlearning" (2024) study groups in Group of Horribly Optimistic STatisticians (GHOST) – a student research society/group at my university. This included researching the area and selecting a relevant set of topics to cover, constructing the agenda, carrying out presentations and tutorials, and leading the meetings.
- Actively participated in three different study groups: "Intro to ML" (2021), "Probabilistic Machine Learning seminar" (2021), "Deep Learning Architectures" (2022).

Data for equity — **June 2024 – August 2024**
Robotics Institute Summer Scholars | Carnegie Mellon University — Pittsburgh PA, USA

- Led the data analysis efforts into investigation of graduate admissions data at CMU.
- Provided actionable feedback to university officials that aimed to help understand the demographics of applicants and proposed actions to diversify their pool of candidates.

RoboLaunch outreach initiative — **September 2023 – December 2023**
Robotics Institute Summer Scholars | Carnegie Mellon University — Pittsburgh PA, USA

- Provided technical support in an outreach initiative focused on organizing seminars with renowned professors to provide direct access for young aspiring researchers to world-class scientists.

Honors and awards

University's President Scholarship — **March 2021 – February 2025**
Poznan University of Technology — Poznan, Poland

- 5x awardee of the semestral scholarship granted to the top 10% of students at the university based on academic performance.

Intel AI4Youth Program Laureate — **March 2019 – December 2019**
III LO im. sw. Jana Kantego w Poznaniu (High school) — Poznan, Poland

- Won a country-wide Intel AI4Youth Program in the competition to invent and prototype a societally relevant ML project.
- Developed a software solution utilizing computer vision techniques for gaze direction estimation to assist individuals with disabilities in operating a computer solely through eye movements tracked via a webcam.

References

Direct contact available on request.

- Prof. Artur Dubrawski · *Carnegie Mellon University*
- Prof. Jerzy Stefanowski · *Poznan University of Technology*
- Dr. Mateusz Lango · *Charles University in Prague* | *Poznan University of Technology*