# Rati Devidze

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Objective: I am a last year (all but dissertation) Ph.D. student working on reinforcement learning with over 7 years of work experience in academia and industry. I am interested in the fields of *Reinforcement Learning, Machine Learning, Data Science, AI,* and *Robotics*.

## Education

**present – Nov 2018** | ***Ph.D. - Computer Science*** **- Saarland University (UdS)** – Germany
- **Focus:** Reward design for reinforcement learning agents.

**Aug 2018 – Sep 2016** | ***Graduate School of Computer Science*** **- Saarland University (UdS)** – Germany
- **Completed Courses:** *The Elements of Statistical Learning*, *Deep Learning*, *Information Retrieval and Data Mining*.

**July 2016 – Sep 2012** | ***B.Sc. - Computer Science*** **- Tbilisi State University (TSU)** – Georgia
- **GPA:** 4/4 (Excellent)
- **Selected courses:** *Algorithms and Data Structures*, *Statistics*, *Discrete Mathematics*, *Operation Research*, *Multivariable Calculus*, *Linear Algebra*.
- **Honors:** President's Scholarship holder.

## Skills

- **Reinforcement Learning:** Reward design; Meta Reinforcement Learning; Inverse Reinforcement Learning; Large Language Models.
- **Machine Learning:** Deep Learning; Inferential Statistics; Applied, Algorithmic, and Theoretical Machine Learning; Optimization; Statistics; Data Science.
- **Soft Skills:** Scientific and Non-scientific Presentations; Teaching; Leadership; Self-management.
- **Languages:** Georgian (native); English (professional); German (C1); Russian (A2).

## Work Experience

**present – Nov 2018** | ***Ph.D. Research Assistant*** **- Max Planck Institute (MPI-SWS)** – Germany
- I started a Reinforcement Learning research at the MPI-SWS. I conduct research focused on reward design in reinforcement learning [3, 1, 2].
- (Inverse-)Reinforcement learning, scientific publications, papers writing, leading research, built systems to gather, process, and analyze different reinforcement learning algorithms and data.

**May 2018 – Feb 2018** | ***Research Immersion Lab*** **- Max Planck Institute (MPI-SWS)** – Germany
- I worked in Machine Teaching Group of Dr. Adish Singla. I contributed to our project with Dr. Parameswaran Kamalaruban where we worked on the iterative machine teaching problem in the context of the Markov Decision Process [4].
- I implemented a Markov Decision Process solver and performed experiments to evaluate theoretical results.

**Sep 2017 – July 2017** | ***Research Immersion Lab*** **- Helmholtz Center for Information Security (CISPA)** – Germany
- Worked on accountability of security protocols. Analyzed the security of these protocols using theorem prover Tamarin.

**Aug 2016 – May 2016** | ***.Net Software Developer*** **- Prodware Group** – Georgia
- Implemented new software products for business ideas.
- Added new features to existing software.

**May 2016 – Mar 2014** | ***Engineer Programmer*** **- Akhali Kselebi Ltd** – Georgia
- Implemented desktop applications for the station operators.
- Analysed international call statistic using ASP.NET charts
- Implemented Windows and Web-services of billing system for telecommunications

## Projects

- **Explicaple Reward Design for Reinforcement Learning Agents:** Scientific work where we seek to capture two properties of reward functions: (a) informativeness so that the rewards speed up the agent's convergence, and (b) sparseness so that the rewards are easy to interpret and debug [3, 2].
- **Exploration-Guided Reward Shaping for Reinforcement Learning under Sparse Rewards:** Scientific work where we used meta-gradient reinforcement learning methods to derive a framework that operates in a fully self-supervised manner and can accelerate an agent's learning even in sparse-reward environments [1].

- **Curriculum Design for Teaching via Demonstrations:** Scientific work where we studied teaching via demonstrations in sequential decision making settings. In particular, how to design a personalized curriculum over demonstrations to speed up the learner's convergence [4, 5].

## Teaching

- **2021:** Teaching Assistant for Reinforcement Learning course at MPI-SWS and Saarland University.
- **2020:** Teaching Assistant for seminar course Multi-agent Reinforcement Learning at MPI-SWS and Saarland University.
- **2019:** Teaching Assistant for seminar course Machine Teaching at MPI-SWS and Saarland University.

## Honors and Awards

- Scholarship at Graduate School of Computer Science at Saarland University (3% of the applicants are selected).
- Granted a German Academic Exchange Service (DAAD) scholarship in 2014 for German language training at RWTH Aachen University.
- President's Scholarship holder at Tbilisi State University

## Selected publications

My work has been published at top venues in machine learning, including ICML, NeurIPS, IJCAI, AAMAS, and more. For a complete list of publications, kindly check my Google Scholar or DBLP profile.


[1] Rati Devidze, Parameswaran Kamalaruban, and Adish Singla. Exploration-guided reward shaping for reinforcement learning under sparse rewards. In *Advances in Neural Information Processing Systems 36th Annual Conference on Neural Information Processing Systems 2022, NeurIPS 2022*.

[2] Rati Devidze, Parameswaran Kamalaruban, and Adish Singla. Informativeness of reward functions in reinforcement learning. In *Proceedings of the 2024 International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2024*.

[3] Rati Devidze, Goran Radanovic, Parameswaran Kamalaruban, and Adish Singla. Explicable reward design for reinforcement learning agents. In *Advances in Neural Information Processing Systems 35th Annual Conference on Neural Information Processing Systems 2021, NeurIPS 2021*.

[4] Parameswaran Kamalaruban, Rati Devidze, Volkan Cevher, and Adish Singla. Interactive teaching algorithms for inverse reinforcement learning. In *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence, IJCAI 2019, Macao, China, August 10-16, 2019*, pages 2692–2700, 2019.

[5] Gaurav Yengera, Rati Devidze, Parameswaran Kamalaruban, and Adish Singla. Curriculum design for teaching via demonstrations: Theory and applications. In *Advances in Neural Information Processing Systems 35th Annual Conference on Neural Information Processing Systems 2021, NeurIPS 2021*.