

Greg (Grgur) Kovač

AI RESEARCHER

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AI researcher specializing in Synthetic data and LLM Evaluation with 5+ years in research (190+ citations) and 1-2 years in industry. EMNLP 2025 Oral on identifying data properties that mitigate degradation in iterative LLM synthetic data generation, and an empirical position paper on LLM robustness (80+ citations). Created and maintained an LLM robustness and validity leaderboard (+32K visits). Proficiency in vLLM, hf datasets/transformers, unsloth, PyTorch, cluster-scale job orchestration, experimental design and statistical analysis. My experience has taught me how to quickly master and contribute to new domains.

Skills and interests

RELEVANT HIGHLIGHTS

- **Synthetic Data Pipelines** for iterative generation and fine-tuning with **vLLM**, **Unsloth**, and **SLURM**
- **Scalable data cleaning pipelines** with **HF-datasets** for large web dataset with 100M posts (e.g. reddit, twitter, wikipedia)
- **Data Attribution**: using regression analysis to outline beneficial and detrimental data properties in single domain, and mixed-domain settings
- **Data Mixtures**: large dataset embedding-based clustering with Sentence Transformers and Scikit-learn; mixing clusters to construct datasets of varying properties
- **Efficient multi-GPU Inference** with vLLM: data cleaning, LLM-as-a-Judge, LLM evaluation/benchmarking
- **Cluster Orchestration** of job workflows with SLURM on the Jean Zay supercomputer
- **Efficient fine-tuning** with unsloth

TECHNICAL SKILLS

- **Specializations**: Synthetic Data (Model Collapse), Training Data, LLM Robustness/Stability Evaluation & Benchmarking, Fine-Tuning
- **Programming**: HF transformers/datasets, Unsloth, PyTorch, sentence-transformers, scikit-learn, Python
- **Infrastructure**: vLLM, SLURM (large cluster), Docker, Git
- **Research**: Statistical Analysis (regression analysis, CFI, FDR, ANOVA), experimental design

OTHER

- **Languages**: English, Croatian, French (Conversational)
- **Hobbies**: Maintaining old/vintage bicycles

Key Achievements

SCIENTIFIC IMPACT

- **EMNLP 2025 Oral** on iterative synthetic data generation
- influential paper on LLM robustness (**80+ citations**)
- total **190+ citations**

PRACTICAL IMPACT

- LLM stability Leaderboard attracting **32K+ visits**
- Training production models; e.g. text-based classifier (**200M+ requests/year**)

Experience

PhD Student | Flowers AI and CogSci Lab (INRIA)

BORDEAUX (FRANCE)

Mar 2022 - Oct 2025

- **Synthetic Data & Model Collapse**: regression-based data attribution to identify data properties that foster or mitigate the degradation (quality, diversity, bias) of LLM generated data during iterative fine-tuning and synthetic data generation (with cross domain data mixtures), i.e. model collapse (**EMNLP 2025, Oral**); 📄, </>
- **LLM evaluation and benchmarking**: Created and maintained the StickToYourRole Leaderboard - evaluating LLM role-play value stability/robustness, validity and reliability of simulated populations (**32K+ visits**, ~1700/month); 📄, </>
- **LLM evaluation and robustness**: presented and empirically supported a positioning of LLM context-sensitivity and culture expression (**80+ citations**); 📄, </>
- **Socio-Cognitive AI**: designed a procedural interactive environment generator based on developmental theories to study generalization of socio-cognitive abilities in Deep RL and LLM-based agents; 📄, </>
- uncovering attractors in iterative LLM-generated stories (**ICLR 2025**, second author: large-scale cluster experiment setup); 📄, </>
- designing an LLM-based reward function generator (curriculum) for a DRL agent (co-author: conceptualization, brainstorming); 📄
- design and initial development of a LLM-based qualitative analysis tool, validation/reliability with human annotations (taken on by another student);

Research engineer | Flowers AI and CogSci Lab (INRIA)

BORDEAUX (FRANCE)

Nov 2019 - Jan 2022

- **Deep RL & automatic curriculum learning**: creating an architecture augmenting novelty based exploration with Absolute Learning Progress for interactive vision-based Deep RL agents
- **Socio-Cognitive AI**: creating interactive environments for Deep RL agents; 📄

Research engineer | Microblink / Photomath

ZAGREB (CROATIA)

Jul 2017 - Sep 2019

- **Computer Vision:** designed and trained production DL models for CV usecases (OCR, classification, ...)
- **NLP:** developed a text-based receipt classifier (classified **200M+ receipts/year**)
- **Efficiency:** creating a binary neural networks training method: large efficiency increase with negligible accuracy drops; NeurIPS 2019 MicroNet efficiency challenge **6th place** (from 19 participating teams)

Education

PhD in Computer Science

FLOWERS TEAM (INRIA) | UNIVERSITY OF BORDEAUX

Mar 2023 - Oct 2025

- **Thesis:** Building, evaluating and understanding socio-cultural AI: leveraging concepts and methods from human sciences; 📄
- **Advisors:** Pierre-Yves Oudeyer (Flowers Team, INRIA), Peter Ford Dominey (CNRS)
- **Jury:** Maarten Sap (CMU), Jan Šnajder (UZG), Clémentine Fourrier (Hugging Face), Mehdi Khamassi (CNRS), Vered Schwartz (UBC)

Master of Computer Science

FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING | UNIVERSITY OF ZAGREB

Oct 2017 - Jun 19

- **Thesis:** Multiple Object Tracking based on Deep Learning; 📄
- **Advisor:** Zoran Kalafatić
- **Relevant course project:** developed an NLP retrieval-based classifier; 📄

Bachelor in Computer Science

FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING | UNIVERSITY OF ZAGREB

Oct 2014 - Jun 17

- **Thesis:** A framework for training feed-forward fully connected neural networks; 📄
- **Advisor:** Zoran Kalafatić

References

RESEARCH

- **Pierre-Yves Oudeyer (PhD advisor)** | Research Director, Flowers AI and Cogsci Lab | pierre-yves.oudeyer@inria.fr
- **Peter Ford Dominey (PhD co-advisor)** | Research Director, CNRS | peter-ford.dominey@u-bourgogne.fr

INDUSTRY

- **Matija Ilijaš (DL Team Lead at Microblink/Photomath)** | Founder of EIGENPIXEL | matija@eigenpixel.ai / matija.ilijas@gmail.com

Publications

PEER-REVIEWED

- Grgur Kovač*, Jérémy Perez*, Rémy Portelas, Peter Ford Dominey, and Pierre-Yves Oudeyer. 2025. Recursive Training Loops in LLMs: How training data properties modulate distribution shift in generated data? In Proceedings of the 2025 Conference on Empirical Methods in Natural Language Processing (EMNLP 2025, Oral)
- Jérémy Perez, Grgur Kovač, Corentin Léger, Cédric Colas, Gaia Molinaro, Maxime Derex, Pierre-Yves Oudeyer, and Clément Moulin-Frier (2025). 'When LLMs Play the Telephone Game: Cultural Attractors as Conceptual Tools to Evaluate LLMs in Multi-turn Settings'. In: *The Thirteenth International Conference on Learning Representations (ICLR 2025)*
- Grgur Kovač, Rémy Portelas, Masataka Sawayama, Peter Ford Dominey, and Pierre-Yves Oudeyer (2024b). 'Stick to your Role! Stability of Personal Values Expressed in Large Language Models'. In: *Proceedings of the Annual Meeting of the Cognitive Science Society*. Vol. 46
- Grgur Kovač, Rémy Portelas, Masataka Sawayama, Peter Ford Dominey, and Pierre-Yves Oudeyer (Aug. 2024a). 'Stick to your role! Stability of personal values expressed in large language models'. In: *PLOS ONE* 19.8
- Grgur Kovač, Rémy Portelas, Peter Ford Dominey, and Pierre-Yves Oudeyer (2024). 'The SocialAI school: a framework leveraging developmental psychology toward artificial socio-cultural agents'. In: *Frontiers in Neurorobotics* Volume 18 - 2024
- Grgur Kovač, Adrien Laversanne-Finot, and Pierre-Yves Oudeyer (2022). 'Grimgep: learning progress for robust goal sampling in visual deep reinforcement learning'. In: *IEEE Transactions on Cognitive and Developmental Systems* 15.3

PREPRINTS

- Grgur Kovač, Masataka Sawayama, Rémy Portelas, Cédric Colas, Peter Ford Dominey, and Pierre-Yves Oudeyer (2023). 'Large language models as superpositions of cultural perspectives'. In: *arXiv preprint arXiv:2307.07870*

WORKSHOPS

- Grgur Kovač*, Rémy Portelas*, Katja Hofmann, and Pierre-Yves Oudeyer (June 2021). ‘SocialAI 0.1: Towards a Benchmark to Stimulate Research on Socio-Cognitive Abilities in Deep Reinforcement Learning Agents’. In: NAACL. Accepted at NAACL ViGIL Workshop 2021. Mexico City, Mexico (Spotlight)
- Grgur Kovač, Rémy Portelas, Peter Ford Dominey, and Pierre-Yves Oudeyer (July 2023). ‘The SocialAI School: Insights from Developmental Psychology Towards Artificial Socio-Cultural Agents’. In: TOM 2023 -First Workshop on Theory of Mind in Communicating Agents - ICML 2023 Workshop. Honolulu (Hawaii), United States
- Guillaume Pourcel, Thomas Carta, Grgur Kovač, and Pierre-Yves Oudeyer (2024). ‘Autotelic LLM-based exploration for goal-conditioned RL’. In: Intrinsically Motivated Open-ended Learning Workshop at NeurIPS 2024

*equal contribution