

Abdelhakim Benechehab | PhD Student

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📄 <https://abenechehab.github.io>

Research Interests

Model-based (deep) Reinforcement Learning, Multi-step predictive models, Uncertainty estimation, In-context Learning, Large Language Models

Education

Doctor of Philosophy (PhD) <i>Sorbonne university, Eurecom Sophia-Antipolis Lab</i> Models with uncertainty for Reinforcement Learning. Advised by Prof Maurizio Filippone	Paris, France 2023-Now
Master of Science - Master MVA (Mathématiques, Vision, Apprentissage) <i>Ecole normale supérieure de Paris-Saclay</i> Convex Optimization, Computer Vision, Reinforcement Learning, Bandits, Deep Learning	Saclay, France 2020-2021
Engineering degree (Grande Ecole) <i>Ecole des Mines de Saint-étienne</i> Major: Data Science. Minor: Artificial Intelligence, Image and Pattern recognition	Saint-étienne, France 2018-2021
Bachelor of Science - Mathematics <i>Jean Monnet university</i> Linear Algebra, Calculus, Topology, Measure theory, Probability & Statistics	Saint-étienne, France 2018-2019
Classe préparatoire aux Grandes Ecoles (CPGE) <i>Lycée Ibn Timiya - MPSI/MP*</i> Mathematics, Physics, Chemistry, French and English	Marrakech, Morocco 2016-2018

Experience

Huawei Research - Noah's Ark Team <i>PhD student</i> Models with uncertainty for Reinforcement Learning. Advised by Giuseppe Paolo, Albert Thomas, and Balázs Kégl	Paris, France 2023-Now
Dental Monitoring <i>Computer Vision research engineer</i> Bracket / Archwire fracture detection using Computer Vision: Object detection, Image segmentation	Paris, France 6 months 2022-2023
Huawei Research - Noah's Ark Team <i>Reinforcement Learning research engineer</i> Benchmarking autoregressive generative models in Offline Model-based Reinforcement Learning	Paris, France 2021-2022
Instadeep <i>Reinforcement Learning intern</i> Leveraging asynchronous training in model-based reinforcement learning (MBRL) Implementing state-of-the-Art MBRL algorithms: PETS, MBPO, and DREAMER-v2	Paris, France 6 months 2021
Amadeus <i>Machine Learning intern</i> Anomaly detection via a Machine Learning approach	Nice Sophia-Antipolis, France 3 months 2020
Mines Etudes & Projets <i>Consultant - Network administrator</i> Network administration at the Ecole des Mines school	Saint-étienne, France 2019-2020

Publications

- **Benechehab, A.**, Hili, Y. A. E., Odonnat, A., Zekri, O., Thomas, A., Paolo, G., Filippone, M., Redko, I., & Kégl, B. (2024). Zero-shot Model-based Reinforcement Learning using Large Language Models. *Preprint*.

- Zekri, O., Odonnat, A., **Benechehab, A.**, Bleistein, L., Boullé, N., & Redko, I. (2024). Large Language Models as Markov Chains. *Preprint*.
- Zekri, O., **Benechehab, A.**, & Redko, I. Can LLMs predict the convergence of Stochastic Gradient Descent?. In *ICML 2024 Workshop on In-Context Learning*.
- **Benechehab, A.**, Thomas, A., Paolo, G., Filippone, M., & Kégl, B. A Study of the Weighted Multi-step Loss Impact on the Predictive Error and the Return in MBRL. In *I Can't Believe It's Not Better Workshop: Failure Modes of Sequential Decision-Making in Practice (RLC 2024)*.
- Thomas, A., **Benechehab, A.**, Paolo, G., & Kégl, B. (2024, February). Fair Model-Based Reinforcement Learning Comparisons with Explicit and Consistent Update Frequency. In *The Third Blogpost Track at ICLR 2024*.
- **Benechehab, A.**, Thomas, A., Paolo, G., Filippone, M., & Kégl, B. (2024). A Multi-step Loss Function for Robust Learning of the Dynamics in Model-based Reinforcement Learning. *Preprint*.
- **Benechehab, A.**, Paolo, G., Thomas, A., Filippone, M., & Kégl, B. (2023). Multi-timestep models for Model-based Reinforcement Learning. *Preprint*.
- **Benechehab, A.**, Thomas, A., & Kégl, B. (2022). Deep autoregressive density nets vs neural ensembles for model-based offline reinforcement learning. *Preprint*.

Technical skills

Deep Learning frameworks: Pytorch, Tensorflow, JAX, Keras

Reinforcement Learning libraries: Gym, MuJoCo, Stable-Baselines3, Deepmind Control, Deepmind ACME, Deepmind Reverb, ray[Tune, RLLib], MBRL-Lib, CleanRL

Divers Python libraries: Numpy, Pandas, Sklearn, OpenCV, Matplotlib, Seaborn, mpi4py, RAMP

Other tools: Docker, Git, Pack Office, \LaTeX , Prezi, draw.io

Achievements

Journal club organization: A research papers reading group *Huawei Research - Noah's Ark Team*

Soft skills professional certificate: Communication, Teamwork, Storytelling *Rochester Institute of Technology*

Highest honors: Granted a merit scholarship to study abroad (France) *CPGE*

Public speaking: Winner's award at a national contest *The ministry of education - Morocco*

Extracurricular activities

Math & Maroc **France & Morocco**
Member, Moroccan NGO *2023-Now*

- Helping the association popularize science-related topics among young Moroccan students
- Organizing a Generative Artificial Intelligence Hackaton to Moroccan students
- Hosting an Artificial Intelligence Podcast in the Moroccan dialect

Antagon TheaterAKTion **Frankfurt, Germany**
Staff *1 month 2019*
Organizing SommerWerft, a free-theater festival in the heart of Frankfurt

Languages

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| - Arabic (Mother tongue) | - Spanish (Intermediate) |
| - English (Advanced) | - Italian (Basics) |
| - French (Bilingual) | |

Interests

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| - Volleyball (8+ years) | - Cultural Travel (30+ countries) |
| - Chess (1500+ Elo) | - Graphic design (Adobe Photoshop) |