

Hojjat Rakhshani

AI Researcher

📍 Amsterdam, Netherlands

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Summary

I focus on developing compact and low-latency recommendation engines, including a context-aware search engine for Decathlon's website that integrates both internal and marketplace data. Ensuring scalable, reusable, and state-of-the-art ML models with minimal latency is a top priority. Previously, I contributed to personalization efforts by developing recommendation systems that enhance the customer experience in physical stores, optimizing product suggestions for a seamless and engaging shopping journey. My academic background includes a PhD from the University of Upper Alsace, where I conducted research in optimization and deep learning. This work led to high-impact publications in top-tier international journals and earned multiple awards.

Skills

Core Skills: Recommendation engines, retrieval-augmented generation (RAG), multi-agent systems, synthetic data generation, model deployment (TGI/vLLM/Tensor-RT), fine-tuning, LLMs & LMs, optimization, AutoML

Programming Languages: Python, SQL, Spark, PyTorch, R

Cloud Platforms: AWS (Bedrock, SageMaker, ECR, EC2, S3), Google Cloud, DataBricks, Airflow

Honors and Awards

- OpenAI Hackathon, top developer, Paris HQ 2025
- 100% PhD scholarship for research and innovation 2017–2020
- [Outstanding dissertation award](#), University of Strasbourg 2020
- [First prize in CG:SHOP Optimization Challenged](#), Challenge, Oregon State 2020
- Outstanding master's student award 2016

Work Experience

Decathlon Digital

Sept. 2024–Present | Amsterdam

- **GenAI:** Developed and led the implementation of a multi-agent semantic search engine for Decathlon's e-commerce platform. The project involved generating synthetic data and fine-tuning multiple agents to enhance the accuracy of search results for high-context user queries. Successfully addressed the challenge of deploying the model using cost-effective small language models, ensuring optimal performance within budget constraints.

May 2021–Nov. 2024 | Lille

- **Personalized Recommendation:** Designed and implemented a recommendation solutions that drove 80 million euros in total sales while reducing stock costs for physical stores. This initiative involved developing algorithms to recommend the optimal product mix for each store, based on sales forecasts and market demand, ensuring alignment with business objectives and customer needs.

- **Text Embedding:** Provided critical support to over four AI teams by developing semantically rich embeddings for product descriptions, visual data, and user behavior. Utilized techniques including BERT and node2vec graph embeddings to enhance data representation and model performance across various applications.

- **Forecasting:** Designed and implemented a comprehensive one-year forecasting model using Amazon SageMaker DeepAR, predicting the turnover of individual stores and products. Additionally, applied XGBoost regression to analyze and quantify the impact of Covid-19 on store performance forecasts, delivering actionable insights for strategic planning.

- **MLOps:** Led a team in analyzing organizational needs, defining technological stacks, and streamlining AI solutions using SageMaker, DataBricks, and Airflow.

Academic Projects

University of Upper Alsace

July 2020–Apr. 2021 | Mulhouse

- **Document Recommendation:** Developed an AutoML pipeline designed to identify and classify relationships between scientific articles. This involved leveraging NLP and feature extraction to construct a robust classifier that achieved a 90% accuracy rate.
- **Neural Architecture Search:** Conducted an extensive neural architecture search (NAS) to optimize deep residual networks for time series prediction tasks. This research achieved state-of-the-art accuracy, surpassing the performance of the leading HIVE-COTE model. The experiments, conducted on 85 diverse instances, demonstrated significant improvements in predictive capabilities.
- **Operation Research:** Investigated a network interdiction problem within the context of a multi-depot vehicle routing model. This research focused on optimizing the routing strategies in the presence of network disruptions, utilizing advanced mathematical modeling and combinatorial optimization techniques.

University of Upper Alsace

May 2017–June 2020 | Mulhouse

- **Optimization:** Introduced a novel optimization framework leveraging transfer and ensemble learning methodologies to significantly reduce computational overhead. This approach involved designing a knowledge retention system that captured and re-applied insights gained from solving one optimization problem to related, yet distinct problems.
- **Crowd Movement Prediction:** Applied metaheuristic optimization algorithms to enhance the predictive accuracy of crowd movement dynamics using the Two-Stream Inflated 3D (I3D) architecture. The I3D model, initially pre-trained on extensive datasets such as ImageNet and Kinetics, was fine-tuned to predict crowd behaviors within the Crowd-11 dataset. This involved optimizing the model's hyperparameters and refining its feature extraction capabilities to improve real-time crowd analysis and forecasting.
- **Multi-Objective Model Configuration:** This work introduced techniques from multi-objective optimization to balance competing objectives such as accuracy, computational efficiency, and robustness. By automating the configuration process, the framework facilitated the deployment of models tailored to specific application needs, streamlining the workflow, and improving overall model performance.

Education

- PhD in Computer Science, University of Upper Alsace 2017–2020
- Master of Computer Science, USB 2013–2016
- Bachelor of Computer Science, USB 2009–2013

Langues

English: Fluent, French : Intermediate

Publications

- [1] Sadegh Etedali and Hojjat Rakhshani. Optimum design of tuned mass dampers using multi-objective cuckoo search for buildings under seismic excitations. *Alexandria engineering journal*, 57(4):3205–3218, 2018.
- [2] Soheila Ghambari, Hojjat Rakhshani, Julien Lepagnot, Laetitia Jourdan, and Lhassane Idoumghar. Unbalanced budget distribution for automatic algorithm configuration. *Soft Computing*, 26(3):1315–1330, 2022.
- [3] Edward Keedwell, Mathieu Brevilliers, Lhassane Idoumghar, Julien Lepagnot, and Hojjat Rakhshani. A novel population initialization method based on support vector machine. In *2018 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, pages 751–756. IEEE, 2018.
- [4] Waldemar W Koczkodaj, J-P Magnot, Jirí Mazurek, James F Peters, Hojjat Rakhshani, Michael Soltys, D Strzałka, Jacek Szybowski, and Arturo Tozzi. On normalization of inconsistency indicators in pairwise comparisons. *International Journal of Approximate Reasoning*, 86:73–79, 2017.
- [5] Amin Rahati and Hojjat Rakhshani. A gene expression programming framework for evolutionary design of metaheuristic algorithms. In *2016 IEEE Congress on Evolutionary Computation (CEC)*, pages 1445–1452. IEEE, 2016.

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- [7] Hojjat Rakhshani. *Les interactions entre le machine learning et la météahéuristic*. PhD thesis, Mulhouse, 2020.
- [8] Hojjat Rakhshani, Effat Dehghanian, and Amin Rahati. Hierarchy cuckoo search algorithm for parameter estimation in biological systems. *Chemometrics and Intelligent Laboratory Systems*, 159:97–107, 2016.
- [9] Hojjat Rakhshani, Effat Dehghanian, and Amin Rahati. Enhanced gromacs: toward a better numerical simulation framework. *Journal of molecular modeling*, 25:1–8, 2019.
- [10] Hojjat Rakhshani, Hassan Ismail Fawaz, Lhassane Idoumghar, Germain Forestier, Julien Lepagnot, Jonathan Weber, Mathieu Brévilliers, and Pierre-Alain Muller. Neural architecture search for time series classification. In *2020 International Joint Conference on Neural Networks (IJCNN)*, pages 1–8. IEEE, 2020.
- [11] Hojjat Rakhshani, Lhassane Idoumghar, Soheila Ghambari, Julien Lepagnot, and Mathieu Brévilliers. On the performance of deep learning for numerical optimization: an application to protein structure prediction. *Applied Soft Computing*, 110:107596, 2021.
- [12] Hojjat Rakhshani, Lhassane Idoumghar, Julien Lepagnot, and Mathieu Brévilliers. Mac: Many-objective automatic algorithm configuration. In *Evolutionary Multi-Criterion Optimization: 10th International Conference, EMO 2019, East Lansing, MI, USA, March 10–13, 2019, Proceedings 10*, pages 241–253. Springer International Publishing, 2019.
- [13] Hojjat Rakhshani, Lhassane Idoumghar, Julien Lepagnot, and Mathieu Brévilliers. Speed up differential evolution for computationally expensive protein structure prediction problems. *Swarm and Evolutionary Computation*, 50:100493, 2019.
- [14] Hojjat Rakhshani, Lhassane Idoumghar, Julien Lepagnot, and Mathieu Brévilliers. From feature selection to continuous optimization. In *Artificial Evolution: 14th International Conference, Évolution Artificielle, EA 2019, Mulhouse, France, October 29–30, 2019, Revised Selected Papers 14*, pages 1–12. Springer International Publishing, 2020.
- [15] Hojjat Rakhshani, Lhassane Idoumghar, Julien Lepagnot, Mathieu Brévilliers, and Edward Keedwell. Automatic hyperparameter selection in autodock. In *2018 IEEE international conference on bioinformatics and biomedicine (BIBM)*, pages 734–738. IEEE, 2018.
- [16] Hojjat Rakhshani, Lhassane Idoumghar, Julien Lepagnot, Mathieu Brévilliers, and Amin Rahati. Accelerating protein structure prediction using active learning and surrogate-based optimization. In *2018 IEEE Congress on Evolutionary Computation (CEC)*, pages 1–6. IEEE, 2018.
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