Hojjat Rakhshani

● France, Lille **→** +33771111368

🔽 Gmail 📊 LinkedIn 🌔 Github 👝 Publications

Skills

Generative AI: Multi-agent application development, synthetic data generation, model deployment(vLLM/Tensor-RT), model fine-tuning (SFT, PPO, DPO, RLHF), long-context

Data Science: Big data pipeline (cleansing, wrangling, visualization, modeling, interpretation), statistics, optimization, AutoML, time series, A/B testing, Scrum fundamentals

Programming Languages: Python (Pandas, scikit-learn, pytest, Tensorflow, PyTorch, SciPy, Gensim), SQL, C++, Java, R

Cloud Machine Learning: AWS (Bedrock, SageMaker, ECR, EMR, S3, RedShift), PySpark, DataBricks, Airflow

Professional Experience

Decathlon

Applied AI Researcher

May 2021–Present

- Lille, France • Semantic Search and Recommendation Systems: Pioneered the development of an advanced search engine for Decathlon's e-commerce platform, leveraging a sophisticated pipeline of multi-agent synthetic data generation and model fine-tuning. My work involved intricate research into generative AI models, including prompt engineering and advanced reinforcement learning techniques such as PPO, DPO, and RLHF. This innovation enabled a semantic search pipeline that substantially improved query accuracy and relevance, elevating user experience with high-context, adaptive search capabilities.
- Assortment Optimization and Revenue Generation: Engineered robust assortment optimization solutions that generated an impressive 80 million euros in total sales, while simultaneously reducing stock costs for physical stores. This involved a strategic application of AI to align inventory management with sales forecasts and market demand.
- Cross-Functional AI Support and Embedding: Provided critical support to over four AI teams by developing semantically rich embeddings for product descriptions, visual data, and user behavior. Utilized advanced techniques including BERT, deep learning architectures, and node2vec graph embeddings to enhance data representation and model performance across various applications.
- Forecasting and Impact Analysis: Designed and implemented a comprehensive one-year forecasting model using Amazon SageMaker DeepAR, accurately predicting turnover for 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.
- Leadership in AI Solution Development: Led a team in analyzing organizational needs, defining technological stacks, and streamlining AI solutions using platforms such as SageMaker, DataBricks, and Airflow. My leadership ensured the alignment of AI projects with business objectives, optimizing the deployment and integration of AI technologies across the company.

University of Upper Alsace

Research Scientists

July 2020–April 2021

Mulhouse, France

- AutoML Pipeline for Scientific Article Linkage: Developed an automated machine learning (AutoML) pipeline designed to identify and classify relationships between scientific articles. This involved leveraging natural language processing (NLP) techniques and feature extraction methods to construct a robust classifier that achieved a 90% accuracy rate. The pipeline's success was highlighted in a publication in the IEEE WCCI 2020 proceedings, showcasing its potential to enhance literature review processes and academic research methodologies.
- Neural Architecture Search and Deep Residual Networks for Time Series Data: 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 and were published in the IJCNN 2020 proceedings. This work contributed to the advancement of time series analysis by providing a more efficient and accurate modeling approach.
- Network Interdiction Multi-Depot Vehicle Routing Model: Investigated a complex 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. The model provided insights into improving logistical efficiency and resilience, offering practical solutions for real-world transportation and supply chain challenges.

University of Upper Alsace

PhD Research Assistant

- Mulhouse, France
- Optimization via Transfer and Ensemble Learning: 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. By integrating transfer learning with ensemble techniques, the framework effectively minimized the computational resources required while maintaining high performance across diverse problem sets.
- AutoML for 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 Framework for ML Model Configuration: Developed a comprehensive multi-objective framework designed to automate the configuration of machine learning models. This framework incorporated 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 optimized models tailored to specific application needs, streamlining the workflow and enhancing overall model performance.

Education

 PhD in Computer Science, University of Upper Alsace Master of Computer Science, University of Sistan and Baluchestan Bachelor of Computer Science, University of Sistan and Baluchestan 	2017–2020 2013–2016 2009–2013
Honors and Awards	
• 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
Langues	

English: Fluent, French : Intermediate, Persian : Native

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.
- [6] Hojjat Rakhshani. The interplay of machine learning and metaheuristics. PhD thesis, Université de Haute Alsace-Mulhouse, 2020.
- [7] Hojjat Rakhshani. Les interactions entre le machine learning et la métaheuristique. 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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- [18] Hojjat Rakhshani and Amin Rahati. Intelligent multiple search strategy cuckoo algorithm for numerical and engineering optimization problems. Arabian Journal for Science and Engineering, 42:567–593, 2017.
- [19] Hojjat Rakhshani and Amin Rahati. Snap-drift cuckoo search: A novel cuckoo search optimization algorithm. Applied Soft Computing, 52:771–794, 2017.
- [20] Hojjat Rakhshani, Amin Rahati, and Effat Dehghanian. Cuckoo search algorithm and its application for secondary protein structure prediction. In 2015 2nd International Conference on Knowledge-Based Engineering and Innovation (KBEI), pages 412–417. IEEE, 2015.