Christian Lülf

MSc.

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As a postdoctoral researcher at the University of Münster, I completed my PhD in July 2024. My passion for machine learning and large-scale computing drives my research, which is focused on their applications in search engines. I am eager to embrace new challenges and seek opportunities to expand my expertise in these fields.

EDUCATION

PhD in Information Systems, *University of Münster*   **11/2020 — 07/2024**

- Research Group: Machine Learning and Data Engineering lab (Advisor: Prof. Fabian Gieseke)
- Thesis: *Advancing Large-Scale Data Retrieval: A Co-Design Approach of Machine Learning and Indexing*
- Grade: *Summa cum laude* (with highest distinction)

MLSS^N Summer School, *Jagiellonian University Kraków*   **06/2022 — 07/2022**

- Engaged in talks and workshops by renowned researchers on current machine learning topics

Master of Science in Information Systems, *University of Münster*   **04/2018 — 08/2020**

- Thesis: *Categorization of Graph Neural Networks in the Area of Organic Chemistry*
- Grade: 1.9 (best: 1.0, worst: 5.0)

Exchange Semester: Master of Science in Computer Science, *University of Sydney*   **08/2019 — 12/2019**

- Courses: Machine Learning, Data Mining, Predictive Analytics, Cyber Security

Bachelor of Science in Information Systems, *University of Applied Sciences Weserbergland*   **08/2014 — 07/2017**

- Thesis: *Evaluation of a Continuous Deployment Procedure with Kubernetes in the Data Center of Atruvia AG*
- Grade: 1.3 (best: 1.0, worst: 5.0)

Higher Education Entrance Qualification, *Wilhelm-Hittorf-Gymnasium Münster*   **08/2006 — 07/2014**

WORK EXPERIENCE

Postdoctoral Researcher   **07/2024 — Present**
University of Münster   *Münster, Germany*

- Extending my research into applications in LLMs

Research Assistant   **11/2020 — 07/2024**
University of Münster   *Münster, Germany*

- Researched on efficient machine learning algorithms resulting into multiple publications.
- Deliveredlectures and supervised bachelor/master theses.

Linux System Engineer   **08/2017 — 10/2020**
Atruvia AG   *Münster, Germany*

- Programmed automation solutions to enhance server management in the data center.
- Engaged in projects to establish a container platform for banking apps (Docker, Kubernetes).

Integrated University Program   **08/2014 — 07/2017**
Atruvia AG   *Münster, Germany*

- Completed a combined university degree and vocational training at Atruvia AG.
- Graduated with highest distinction in both academic and vocational components.

Selected Publications

Lülf, C., Martins, D., Vaz Salles, M., Zhou, Y., Gieseke, F. *CLIP-Branches: Interactive Fine-Tuning for Text-Image Retrieval.* In Proceedings of the International ACM SIGIR Conference. 07/2024

Lülf, C., Martins, D., Vaz Salles, M., Zhou, Y., Gieseke, F. *Fast Search-By-Classification for Large-Scale Databases Using Index-Aware Decision Trees and Random Forests.* In Proceedings of the VLDB Endowment. 08/2023

Lülf, C., Martins, D., Vaz Salles, M., Zhou, Y., Gieseke, F. *RapidEarth: A Search Engine for Large-Scale Geospatial Imagery. In Proceedings of the ACM SIGSPATIAL.* 08/2023

Martins, D., Lülf, C., Gieseke, F. *End-to-end Neural Network Training for Hyperbox-Based Classification.* In European Symposium on Artificial Neural Networks, ESANN. 06/2023

Skills

Programming	Python, Bash, Java, JavaScript, R, SQL, C, C++
Tools & Software	Linux, Docker, Kubernetes, Numpy/Pandas, PyTorch, Tensorflow, Git, LaTeX, GDAL
Communication	German (native), English (fluent)

Selected Software Projects

decisionbranches ⌾	A novel machine learning model for efficient search using a small set of positive and negative examples with range queries.
rapidearth ⌾	A geospatial search engine that rapidly searches large satellite imagery collections using decision branches and indexing.
clip-branches ⌾	An interactive text-image search engine on the basis of a multi-modal language model that enhances traditional search by incorporating user feedback for fine-tuning.
py-kdtree ⌾	A highly efficient Python library for k-d trees using Cython for performance improvements in nearest neighbor search.
sa-segmentation ⌾	A deep learning project using a U-Net to segment individual trees and shrubs across South Africa.

Certifications & Awards

Best Demo Award at ACM SIGSPATIAL 2023	11/2023
Scholarship PROMOS of the German Academic Exchange Service	07/2019
Top 10% of the of the graduating class at University of Applied Sciences Weserbergland	07/2017
Scholarship Deutschlandstipendium (Maximum funding rate: 1.45 % of all students)	09/2016
Certified Computer Science Expert by the Chamber of Industry and Commerce (with honors)	06/2016

Talks

ERCIS Workshop, Münster	06/2024
ACM SIGSPATIAL'23 International Conference on Advances in Geographic Information Systems, Hamburg	11/2023
ERCIS Lunchtime Seminar, Münster	10/2023
VLDB'23 International Conference on Very Large Data Bases, Vancouver	08/2023
TDWI Roundtable, Münster	05/2023
MLSS^N Summer School, Kraków	06/2022

Teaching Experience & University Services

Teaching Assistant

- Facilitated tutorials and lectures, along with grading assignments, for courses within our research group.
- Courses: Data Analytics, Management Information Systems & Data Warehousing, Data Integration

Administrator of Cloud Infrastructure

- Led the deployment and management of an advanced cloud infrastructure with GPU support for research purposes.
- Technologies: Kubernetes, Docker, CephFS, PyTorch.

Thesis Supervisor

- Successfully guided over ten bachelor's and master's theses, contributing to significant academic advancements.
- Topic Overview: Approximate nearest neighbor search, multi-task transformer learning in NLP, deep learning for tree canopy segmentation