

# Rinor Cakaj

DATA SCIENTIST & ML RESEARCHER (PHD)

✉ cakajrinor@gmail.com | 🌐 www.rinorcakaj.com | 📷 rinorcakaj | 📺 rinorcakaj

## Summary

Data Scientist at Wayve working on dataset quality and scalable data curation for autonomous driving. Completed an industrial PhD in Deep Learning at the University of Stuttgart in cooperation with Robert Bosch GmbH, focused on efficient computer vision models for real-world deployment.

- **Research:** Mixture-of-Depths (MoD) for CNNs (ACCV 2024), enabling up to 25% CPU / 15% GPU inference speed-ups at maintained accuracy across ImageNet, Cityscapes, and Pascal VOC.
- **Publications & IP:** 5 publications; 5 patent applications (1 published).
- **Industry:** Wayve (autonomous driving ML), Robert Bosch GmbH (industrial PhD), Quality Match (data quality).
- **Workshops:** Designed and delivered workshops on AI/LLM fundamentals, prompt engineering, and responsible AI for workplace settings (200+ participants).

## Education

### University of Stuttgart

Stuttgart, Germany

PhD in Deep Learning | Institute of Signal Processing and System Theory

Sep. 2021 - Nov. 2025

- Developed the Mixture-of-Depths (MoD) technique for CNNs, optimizing computational efficiency by selectively processing relevant channels in feature maps (accepted at ACCV 2024). Key performance highlights:
  - Image Recognition (ImageNet): ResNet75-MoD matches ResNet50's accuracy with a 25% speed-up on CPU and 15% on GPU; ResNet86-MoD improves accuracy by 0.45%, with a 6% speed-up on CPU and 5% on GPU.
  - Semantic Segmentation (Cityscapes): FCN with ResNet86-MoD increases mIoU by 0.95% with similar computational costs.
  - Object Detection (Pascal VOC): Faster-RCNN with ResNet86-MoD raises mAP by 0.37% and AP50 by 0.4%, achieving a 10% CPU speed-up.
- Industrial PhD in cooperation with Robert Bosch GmbH; advised by Prof. Dr.-Eng. Bin Yang.

### Technical University (TU) of Darmstadt

Darmstadt, Germany

M.Sc. Mathematics interdisciplinary Informatics

Oct. 2019 - Aug. 2021

- Advanced courses in mathematical optimization (Discrete Optimization, Nonlinear Optimization) and computer science (Statistical Machine Learning, Data Mining and Machine Learning, Artificial Intelligence).
- Minor in economics (Creating a Web Startup, Digital Transformations and Software & Digital Business).
- Master thesis: Exact Rule Learning via Boolean Compressed Sensing (1,3).
- GPA (German): 1,25

### Technical University (TU) of Darmstadt

Darmstadt, Germany

B.Sc. Mathematics with Economics bilingual

Oct. 2016 - Sep. 2019

- Fundamentals in a broad range of mathematical areas (Analysis, Linear Algebra, Optimization, Stochastics, Numerical Analysis).
- Minor in economics (Micro- and Macroeconomics, Bookkeeping and Cost Accounting, Principles of Business Administration).
- Minor in computer science (Functional and Object-oriented Programming Concepts and Algorithms and Data Structures).
- Topic of bachelor thesis: Portfolio Optimization (1,3).
- GPA (German): 2,20

## Work Experience

### Wayve

Leonberg, Germany

Data Scientist

Dec. 2025 - Present

- Working on machine learning for autonomous driving with a focus on dataset quality and scalable data curation.
- Developing evaluation workflows and quality signals to support training and validation at scale.
- Collaborating with research and engineering teams to improve feedback loops between model performance and data.

### Quality Match GmbH

Heidelberg, Germany

Solution Architect

Mar. 2025 - Nov. 2025

- Developing AI-driven techniques to automatically evaluate and improve data quality.
- Designing and building Nano-Task Trees and pipelines for efficient data annotation.
- Implementing a LLM-based solution that automatically designs Nano-Tasks.

## Fletza

Co-Founder & Full Stack Developer

Stuttgart, Germany

Jan. 2025 – Present

- An AI-driven platform that transforms lecture materials (PDF, Word, PPTX) into flashcards, quizzes, and exam questions.
- The platform uses the SM-2 algorithm (similar to Anki) for effective learning and offers exam simulations with automatic feedback.
- Learn more at [www.fletza.com](http://www.fletza.com).

## Robert Bosch GmbH

Stuttgart, Germany

PhD Researcher in Deep Learning | Division Cross-Computing Solutions (XC) in the field for

Sep. 2021 - Feb. 2025

Advanced Driver Assistance Systems (ADAS)

- Authored five patents related to the novel methods developed during my PhD, with one already published and four currently under review.
- Onboarded and provided technical guidance to two PhD students in their initial phases.
- Collaborated with the University of Stuttgart under the supervision of Dr. rer. nat. Jens Mehnert.

## Ministry of Foreign Affairs and Diaspora, Republic of Kosovo

Pristina, Kosovo

Diaspora Professional Engagement | Economic Division

15 Oct. 2024 - 31 Oct. 2024

- Analyzed Kosovo's export and import data by product from 2010 to 2023, using Python for data processing.
- Developed recommendations to support Kosovo's economic policy, with insights drawn from tools like the BCG Matrix.

## Segura & Jesberger GmbH

Frankfurt am Main, Germany

Working Student | Family Office

Feb. 2018 - Aug. 2021

- Digitized an annual capital market survey by coding a website using HTML, CSS, PHP, MySQL, and JavaScript, saving one month of work for a working student each year.
- Developed Python-based software for automatic portfolio verification, using OCR to extract tables from printed pages and compare them with Excel data, saving 16 hours of work each month.
- Developed automated data processing applications in Excel using VBA.

## KPMG AG

Frankfurt am Main, Germany

Working Student | CIO Consulting - Digital Strategy

Nov. 2017 - Jan. 2018

- Researched technological trends to support digital strategy development, focusing on data-driven decision-making.
- Contributed to creating data and analytics training programs to enhance employee skills.

## Talks & Workshops

  
**2+**

Years as Speaker

  
**200+**

Participants Trained

  
**11+**

Sessions Conducted

### Digital Works Council Practices with AI

Online

Speaker

08 Dec. 2025

- Delivered an introductory online workshop on AI and Large Language Models, tailored to digital works council practices.

### AI in the Workplace – Works Council Workshop

Augsburg, Germany

Speaker

21 Oct. 2025 - 23 Oct. 2025

- Repeat delivery of the workshop (same curriculum as 15 Oct. 2025 - 17 Oct. 2025).

### AI in the Workplace – Works Council Workshop

Augsburg, Germany

Speaker

15 Oct. 2025 - 17 Oct. 2025

- Designed and delivered the same workshop on AI in the workplace across three days for different works council groups, covering AI fundamentals and practical applications.
- Led hands-on sessions on prompt engineering, live demonstrations of generative AI tools, and scenario-based group exercises for critical evaluation of AI outputs.

### AI Officer – Course

Mannheim, Germany

Speaker

01 Oct. 2025

- Delivered an updated version of the AI Officer curriculum (based on the Hamburg session, 10 Apr. 2025), introducing a new module on AI Agents and autonomous reasoning systems.

### AI Officer – Course

Stuttgart, Germany

Speaker

20 May 2025

- Delivered the same AI Officer curriculum as the Hamburg session on 10 Apr. 2025, covering Generative AI, Large Language Models, and prompt engineering.

AI Governance – Workshop

Erlangen, Germany

Technical Advisor

13 May 2025

- Provided technical input on the integration of AI systems into workplace environments with a focus on large language models and generative AI.
- Advised on key aspects relevant for a works council agreement, including model limitations, data usage, and monitoring mechanisms.
- Explained the operational principles of models like GPT, highlighting implications for fairness and interpretability.

AI Officer – Course

Hamburg, Germany

Speaker

10 Apr. 2025

- Introduced key topics in Generative AI, Machine Learning, and Deep Learning, with a focus on practical relevance.
- Explained the architecture and training process of GPT, including data collection, filtering, and pretraining, and showed how ChatGPT builds on this with instruction tuning, dialogue optimization, and user feedback.
- Presented key techniques such as Retrieval-Augmented Generation (RAG) and Reinforcement Learning from Human Feedback (RLHF).
- Explained prompt engineering strategies, including prompt structure, iterative refinement methods, and supporting tools.

Skills

Programming	Python	● ● ● ● ●	C++	● ● ● ○ ○
	PyTorch	● ● ● ● ●	TensorFlow	● ● ● ● ○
Deep Learning	Anaconda	● ● ● ● ○	TensorBoard	● ● ● ● ○
	CUDA	● ● ○ ○ ○		
Development & Documentation	Git	● ● ● ● ●	Docker	● ● ● ○ ○
	VS Code	● ● ● ● ○	Sphinx	● ● ● ○ ○
	Pytest	● ● ● ○ ○		
Data Science	Pandas	● ● ● ● ○	NumPy	● ● ● ● ○
	Matplotlib	● ● ● ● ○	SQL	● ● ● ○ ○
Languages	German	● ● ● ● ●	English	● ● ● ● ●
	French	● ● ○ ○ ○	Albanian	● ● ● ● ●

Publications

Conference Proceedings

- [1]

**CNN Mixture-of-Depths**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
*2024 Asian Conference on Computer Vision (ACCV), Hanoi, Vietnam*
- [2]

**Spectral Wavelet Dropout: Regularization in the Wavelet Domain**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
*2024 International Conference on Machine Learning and Applications (ICMLA), Miami, Florida, USA*
- [3]

**Squeeze-and-Remember Block**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
*2024 International Conference on Machine Learning and Applications (ICMLA), Miami, Florida, USA*
- [4]

**Spectral Batch Normalization: Normalization in the Frequency Domain**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
*2023 International Joint Conference on Neural Networks (IJCNN), Gold Coast, Australia*
- [5]

**Weight Compander: A Simple Weight Reparameterization for Regularization**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
*2023 International Joint Conference on Neural Networks (IJCNN), Gold Coast, Australia*

Patents

Published Patents

- [1]

**Method for Regularizing a Neural Network**  
**Rinor Cakaj, Jens Mehnert, Bin Yang**  
No.: EP4343619, Date: 27 Mar. 2024, Assignee: Robert Bosch GmbH

# Projects & Competitions

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## Bosch Hackathon - Capture the Flag (CTF)

HTB Platform

Participant

7 Oct. 2024 - 10 Oct. 2024

- Collaborating with a colleague on CTF challenges in web, forensics, reversing, OSINT, hardware, and crypto.
- Solved tasks such as SQL injection, template injection, XSS, and buffer overflow.
- Gained hands-on experience with Python, JavaScript (client- and server-side), Linux command line, and a basic understanding of the OWASP Top 10 vulnerabilities.

## Stock Index Trend Prediction Tool

Personal Project

Mar. 2023 - Present

- Developed an end-to-end deep learning pipeline for stock index trend prediction, including automated web scraping with data integrity checks, data processing with rolling statistics and augmentation.
- Built a deep learning model using multi-scale convolutions for pattern recognition and BiLSTM layers for temporal dependencies.
- Worked independently, using a variety of tools and libraries:
  - Development Environment: JupyterLab, VS Code, Anaconda
  - Data Processing & Visualization: Pandas, NumPy, Plotly, Matplotlib, Scipy
  - Automation & Testing: Selenium, Pytest, Optuna
  - Model Tracking & Deployment: Weights & Biases, TensorBoard, Docker, Git
  - Documentation: Sphinx

# Volunteering

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## Erster Sindlinger Schwimm-Club 1901 e.V.

Frankfurt am Main, Germany

Member of the Executive Board, Treasurer and Trainer

Jun. 2018 - Jun. 2022

- Introduced and administered Office 365 to enhance collaboration between trainers and the board.
- Ordered and implemented electronic membership cards (RFID) with an access control system on a Raspberry Pi 4 using Python.
- Rewrote statutes and regulations for business, contributions, data protection, training, and honorary policies.
- Redesigned the website.
- Handled cash office responsibilities, including tax returns, bookkeeping, grant applications, collection of membership fees, compensation payments for exercise leaders, and donation processing.
- Taught children how to swim.