UNIVERSITÄT HOHENHEIM | Computational Science Hub

Building Sustainable Innovation Ecosystems: Lessons from AI Collaboration and the Computational Science Hub

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Connect. Equip. Achieve.

Connect

people • partnerships • diverse networks

Equip

infrastructure • skills • resources

Achieve

meaningful goals • impact

Short CV

since 04/2025	„Akad. Rat“ ∼ (tenured) Assistant Professor *University of Hohenheim*
2022–2025	AIDAHO Project Coordinator & CSH Manager *University of Hohenheim*
2020–2022	Risk Controlling *Bausparkasse Schwäbisch Hall*
2016–2020	Research Assist., PhD in financial econometrics *Eberhard-Karls University Tübingen*
2012–2015	M.Sc. Economics & Finance *Eberhard-Karls University Tübingen*
2012–2014	Accredited Parliamentary Assistant *European Parliament, BRU & STR*
2009–2012	B.Sc. Int. Economics & European Studies *Eberhard-Karls University Tübingen*

University of Hohenheim

- 3 faculties
  - Agricultural Sciences (29%)
  - Natural Sciences (16%)
  - Economics, Business & Social Sciences (55%)
- Ranked among the **top 5%** universities in agricultural research & food science
- About 9,000 students
- 126 professors
- 900 research staff

Computational Science Hub

Cross-faculty on computationally intensive research

- high-performance computing
- data management
- artificial intelligence
- simulation
- digital twinning
- social network analysis
- agent-based models
- micro-econometrics
- statistical learning
- geographic information systems
- image analysis
- text mining
- ...

25 professors working on compute-intensive research with associated staff and PhD researchers

Mission: accelerate interdisciplinary, data-driven research and education.

CSH Speaker, Board & Working Group

Speaker	Prof. Dr. Robert Jung
Board	Prof. Dr. Thilo Streck
	Prof. Dr. Jens Vogelgesang
Working Groups:	Network Analysis
	High Performance Computing
	Hybrid Intelligence
	Generative Artificial Intelligence
Recent success	CSH members (mainly Profs. K. Schmid & W. Schulze – GreenRobust, T. Streck – TERRA, F. Schünemann – IntCDC) acquired federal state funding for so-called Excellence Clusters (together with Uni Tübingen and Stuttgart)

Activities

CSH Seminar	monthly
CSH Young Researchers Seminar	monthly
CSH Symposium	$\sim$ each semester
CSH Young Researchers Symposium	$\sim$ each semester
CSH Workshop	yearly
Members committee	yearly

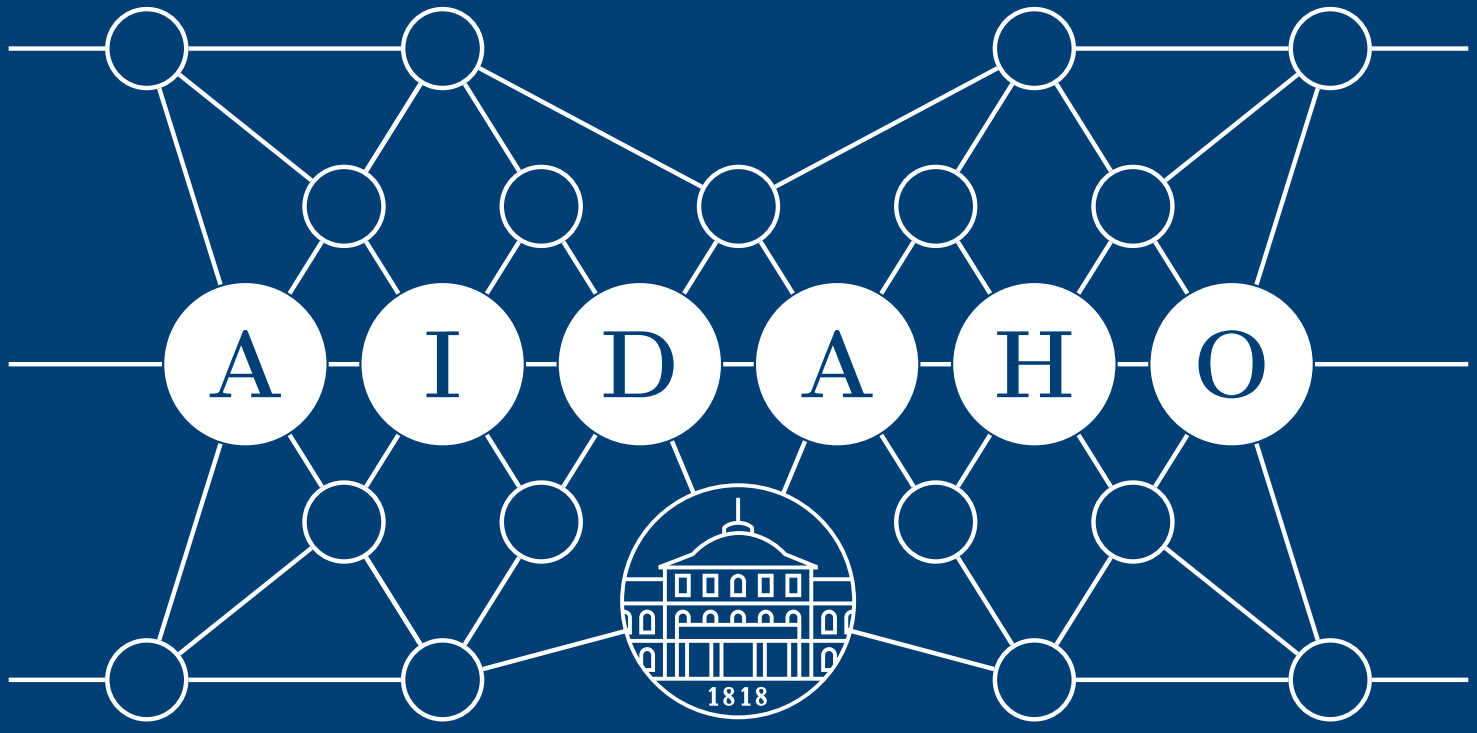
CSH Winter, Spring and Autumn Schools

- **CSH Spring School 2023:**
  Social Network Analysis *(by Thomas Hills, U Warwick)*

- **CSH Spring School 2024:**
  Reproducible Science with Containerization on High Performance Computing Infrastructure
  (by Johannes Bleher and Konstantin Kuck, UHOH)

- **CSH Autumn School 2024:**
  Understanding and Training Language Models Applications in Sentiment Analysis
  (by Erik-Jan Senn, U St. Gallen)

- **CSH Winter School 2025:**
  Homomorphic Cryptography
  (by Thomas Prantl, U Würzburg)



AI & Data Science Certificate Hohenheim

UNIVERSITÄT HOHENHEIM

Computational Science Hub

Baden-Württemberg

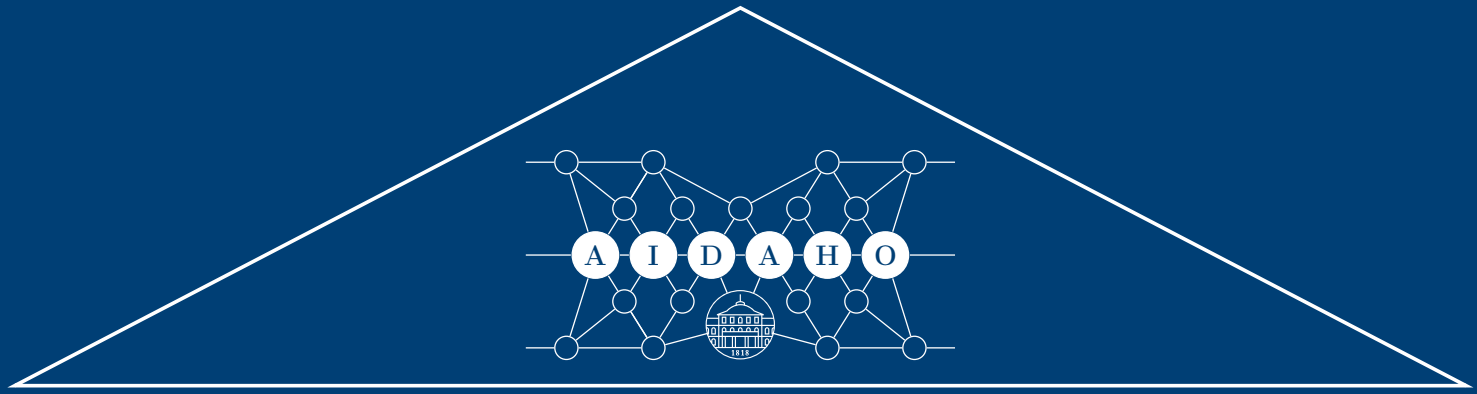
MINISTERIUM FÜR WISSENSCHAFT, FORSCHUNG UND KUNST

GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

Project Details

AIDAHO	Certificate for students of all faculties alongside the main study program subsidized by the federal state
Volume	EUR 1.4 mio
Duration	4 years (until 2025/11)
PIs	Anthony Stein (Agriculture) Christian Krupitzer (Natural Sciences) Robert Jung & Jens Vogelgesang (both Economics, Business & Social Sciences)
Staff	$\sim$ 1 PostDoc, 3 teaching/research assistants



AIDAHO Lectures

Current Topics in AI & Data Science – Law, Ethics & Sustainability

Specializing modules

Methodological In-Depth Lecture

Application or Cooperation Seminar

Basic modules

Introduction to Machine Learning with Python

Introduction to Data Science with R and RStudio

Tools for AI & Data Science

- Introduction
- Python
- R and RStudio
- Data Management & SQL

Hands-on Learning

Dashboard for the Jobsuche API of the Arbeitsagentur

Some Information

This dashboard was created as part of the “Take Home Assignment” of the course “Introduction to Data Science with R and RStudio” in the summer term 2024.

It shows the current job offerings retrieved from the official “Jobsuche API” of the “Arbeitsagentur.”

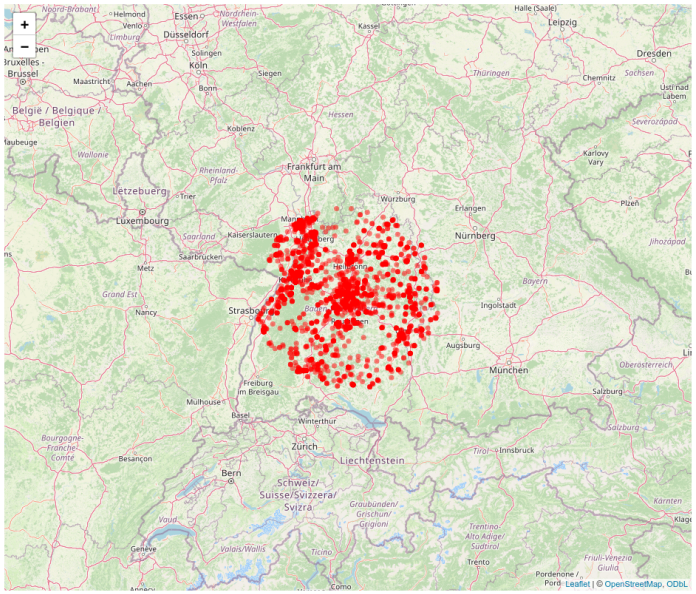
For more information, see:

- Jobsuche API: GitHub - bundesAPI - Jobsuche
- More Bund APIs can be found here: GitHub - bundesAPI

For its creation, the following tools were used:

- R software for data retrieving and wrangling
- RMarkdown for data visualization
- Docker container for cloud deployment
- Shell scripts and cron jobs

All job results for the term “Daten”



Ten, most recent job results for the term “Daten”

Datum	Beruf	Title	Arbeitgeber
2025-09-27	Digital-Sales-Manager/in	Sales Manager (w/m/d) Fokus Sn	INFOMOTION GmbH
2025-09-27	EDV-Fachkraft	IT Mitarbeiter Staging / Wipin	puro Personaldienstleistung Gm
2025-09-27	Informatiker/in	DevOps Engineer (m/w/d)	Orizon GmbH Aviation
2025-09-27	Informatiker/in	Software-Architekt C++ (m/w/d)	Orizon GmbH Aviation
2025-09-27	Technische/r Redakteur/in	Technical Writer * - Roche Man	Franz & Wach Personalservice P
2025-09-26	Fachinformatiker/in - Daten- u	Fachinformatiker (m/w/d)	Nordschwäbische Werkstätten gG
2025-09-26	Informatikkaufmann/-frau	IT Manager (w/m/d)	Frank Günther Jobaktivisten
2025-09-26	Ingenieur/in - Energietechnik	Leiter Stromnetzplanung (m/w/d	Gese & Cie. Personalberatung G
2025-09-26	Lohn- und Gehaltsbuchhalter/in	Entgeltabrechner (w/m/d) in Vo	Fischer Partner Gesellschaft
2025-09-26	Lohn- und Gehaltsbuchhalter/in	Entgeltabrechner (w/m/d) in Vo	Fischer Partner Gesellschaft

Website & AIDAHO App Universe

aidaho.uni-hohenheim.de

aidaho-edu.uni-hohenheim.de

- Self-hosted AIDAHO JupyterHub (on bare-metal kubernetes)
- Self-hosted LLM endpoints (ollama-queuing)
- Automatic grading platform (GRAIDAHO)
- Self-hosted Gitlab, with Gitlab-pages, Docker-Registry, ...
- AIDAHO Dashboard
- AIDAHO survey app
- administration apps
- Additionally: bwCloud + bwJupyterhub

Collaboration Partners

AI-Powered Video Analysis for 24/7 Retail

AIDAHO Applied Data Science Lab & Landmetzgerei Setzer

2 Bachelor students (L. Knill and E. Bordin) developed a prototyp to turn surveillance videos into *actionable insights*:

- Theft detection and incident review.
- Customer behavior insights (visits, interactions).
- Operational efficiency via automation.

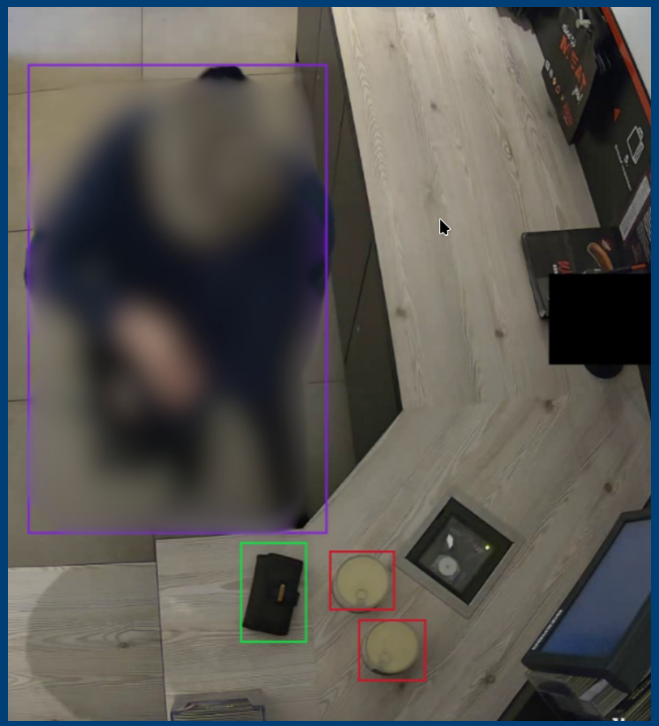
Approach in a nutshell:

- Automated pipeline: preprocessing $\rightarrow$ motion detection $\rightarrow$ object detection $\rightarrow$ reporting
- Fine-tuned YOLO on 1,000 + annotated frames (persons, relevant & non-relevant items)
- Semi-daily Excel summaries with motion intervals, items, and visitor stats

AI-Powered Video Analysis for 24/7 Retail

End-to-end workflow

- **Input management:** 30-min clips (AM/PM), integrity checks
- **Preprocessing:** FPS/resolution reduction, ROI cropping
- **Motion detection:** MOG2, merge short intervals, filter static/lighting noise
- **Object detection:** YOLO on motion windows; people & items (scan/handle)
- **Reporting:** Per half-day Excel with intervals, counts, item types



AI-Powered Video Analysis for 24/7 Retail

Benefits

- Efficient compute (focus on motion only)
- Improved theft prevention and purchase tracking
- Clear, structured outputs for decisions
- Scales to continuous 24/7 operations

Disadvantages & Challenges

- **Computational demands** (even with pre-processing)
- **Item tracking** no 360° cameras, covered objects reappearing
- **Annotation effort** (feasible with product database)
- **Integration gap** AI is not yet fully connected with sales/transaction logs, limiting cross-checking.
- **Scalability issues:** multi-store rollout could create synchronization, bandwidth, and maintenance challenges.

From Teaching to Research Cooperation

- Collaboration between academia (UHOH & KIT), a sensor manufacturer, a packaging-machinery specialist, and a regional butchery
- Combining academic expertise with practical food processing experience
- Shared goal: strengthen small and local businesses while preserving tradition

- Applying digital tools and AI to support traditional production methods

The Project

- Proof of concept: scalable digital pipeline for measurement data from mixed substances (German meat loaf (Leberkäse), sauces,...)
- Structured, open-access data for research and teaching
- Demonstrated potential for further digitization projects (e.g. statistical archives)
- Added value: preservation of cultural heritage, innovation in food research, and interdisciplinary success.