ST. PÖLTEN UNIVERSITY
OF APPLIED SCIENCES

CAI

fh st.pölten

Center for Artificial Intelligence

cai.fhstp.ac.at

Matthias Zeppelzauer

OEAD Hochschultagung 2024

November 13, 2024


AI

Strategic Goals of the Center

Increase visibility of AI research

Combine our mutual strengths

Central point of contact for new collaborations

Who stands behind CAI?

Joint effort of three research institutes

Institute of
IT Security Research

Institute of
Creative Media Technologies

Institute for
Innovation Systems

Complementary methodology, perspectives & research foci

International Embedding

Association with European University E³UDRES²

E³UDRES²

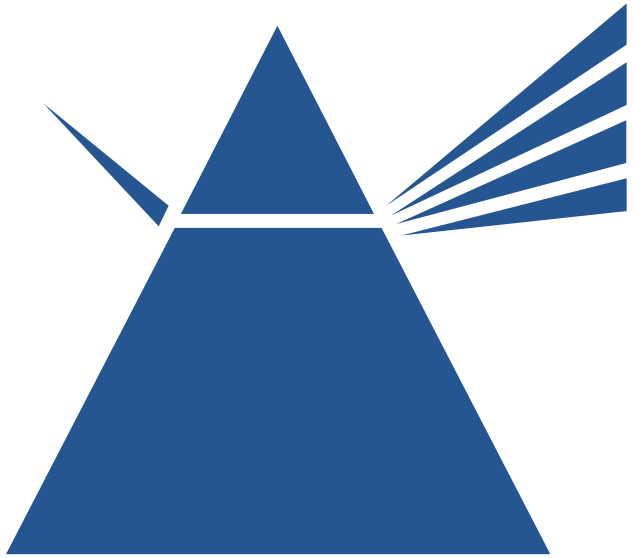
https://eudres.eu

Our Vision

Advance AI research and develop novel and innovative solutions that bring tangible benefits to individuals, businesses, society, and the environment.

Our USP

Cover a broad spectrum of AI – all under one roof



From basic research to applied research

From symbolic to statistical AI

Covering the entire AI life cycle

Tackling diverse data/media types

Interdisciplinary problem settings

Challenges in AI

CAI tackles principal AI challenges

Improve human-AI collaboration

Privacy-preserving and secure AI

Fair, transparent and trustworthy AI

Lifecycle management for AI

Learn from unstructured & unlabeled data

CAI fosters Internationalization

International research collaboration (EUDRES, EU Horizon projects)

Attract international researchers (e.g. for PhD programs)

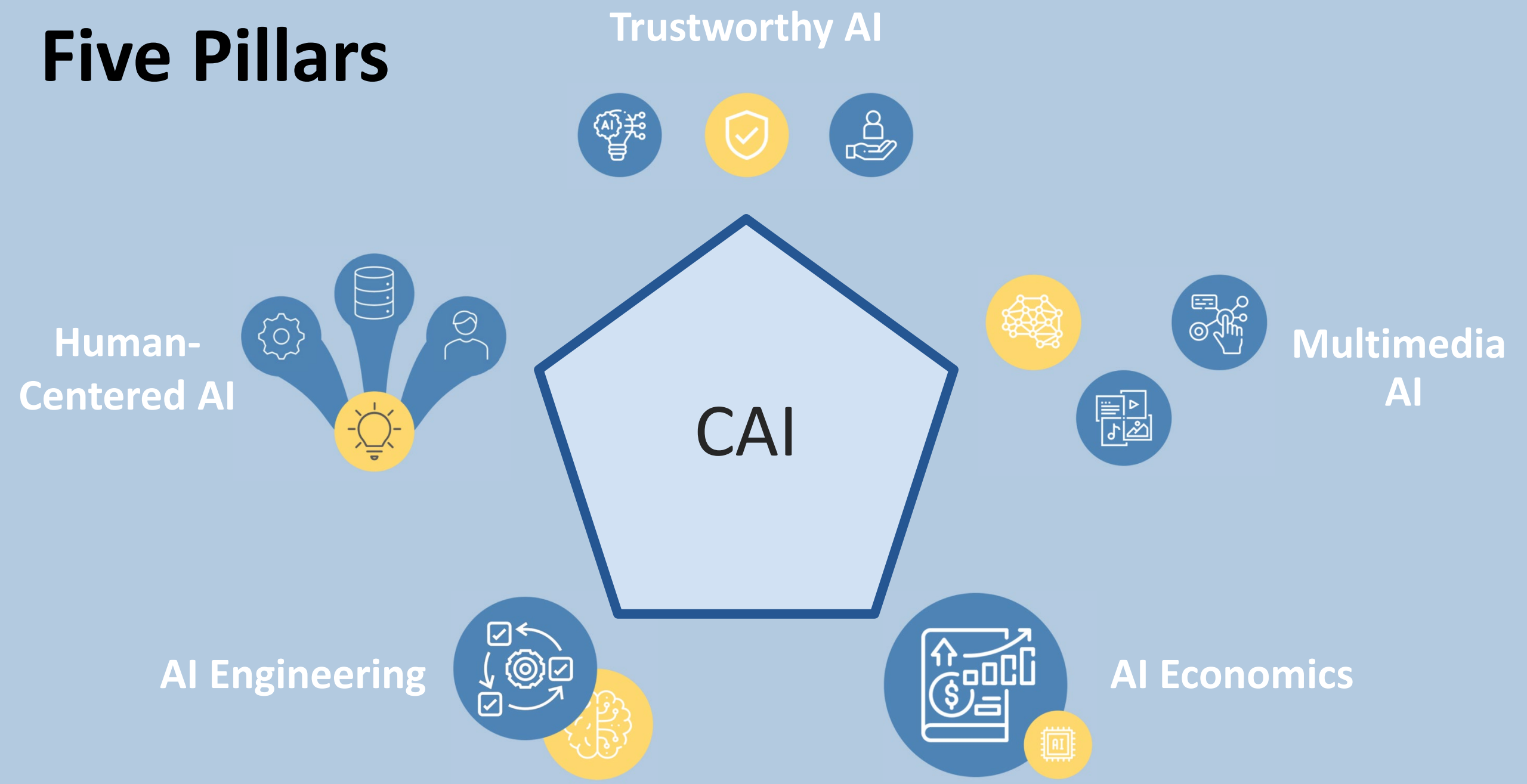
Contribute current AI topics to teaching to improve attractiveness → attract international students

Enrich current discourse on risks and opportunities of AI

Team

https://cai.fhstp.ac.at/team

Five Pillars



Human-Centered AI

Human-centric paradigms for collaborative and assistive AI

Coordinator
Matthias Zeppelzauer

Interactive machine learning

Joint human-machine collaboration

Combined human knowledge generation & learning

Visual analytics / interactive visualization

Application: exploration and learning from unlabeled data

Trustworthy AI

Providing trust and security in artificial intelligence

Coordinator
Peter Kieseberg

Achieve trust by

- Fairness
- Robustness / adversarial attacks
- Privacy protection
- Accountability & transparency

Multimedia AI

Understanding multimodal media data

Coordinator
Markus Seidl

Computer vision & natural language processing (NLP)

Time series analysis

Multimodal machine learning

Applications: Search cultural heritage collections
Social media analysis / fake news detection
Automated real estate assessment

AI Engineering

Managing the AI life cycle for businesses

Coordinator
Torsten Priebe

Data acquisition, synthesis, preparation

DevOps / AIOps

AI architectures / cloud computing

Federated / distributed machine learning

Knowledge graphs, linked data

AI Economics

AI to support management decisions, process control and automation

Coordinator
Tassilo Pellegrini

Analyze five problems from a business perspective:

- The bias problem
- The fairness problem
- The blackbox problem
- The confidence problem
- The access problem

CAI in Teaching / Further Education

AI in multiple curricula (bachelor + master)

Teaching AI fundamentals and AI literacy

Tools for rapid prototyping of solutions

Multiple perspectives on ML / AI

Students and Alumni with strong AI expertise

CAI in Teaching / Further Education

Study Programmes

- **Creative Computing (Bachelor)**
- **Data Science and Business Analytics (Bachelor)**
- **Media Technology (Bachelor)**
- **Smart Engineering of Production Technologies and Processes (Bachelor)**
- **Data Intelligence (Master)**
- **Interactive Technologies (Master)**
- **Digital Healthcare (Master)**
- **Applied Research and Innovation in Computer Science (Master)**

Our Offer

Cooperative research projects (FWF, FFG, GFF, EU)

Contract research

Consulting

Bachelor / master theses

Jointly supervised internships

Contact our coordinators

Current Research Strands

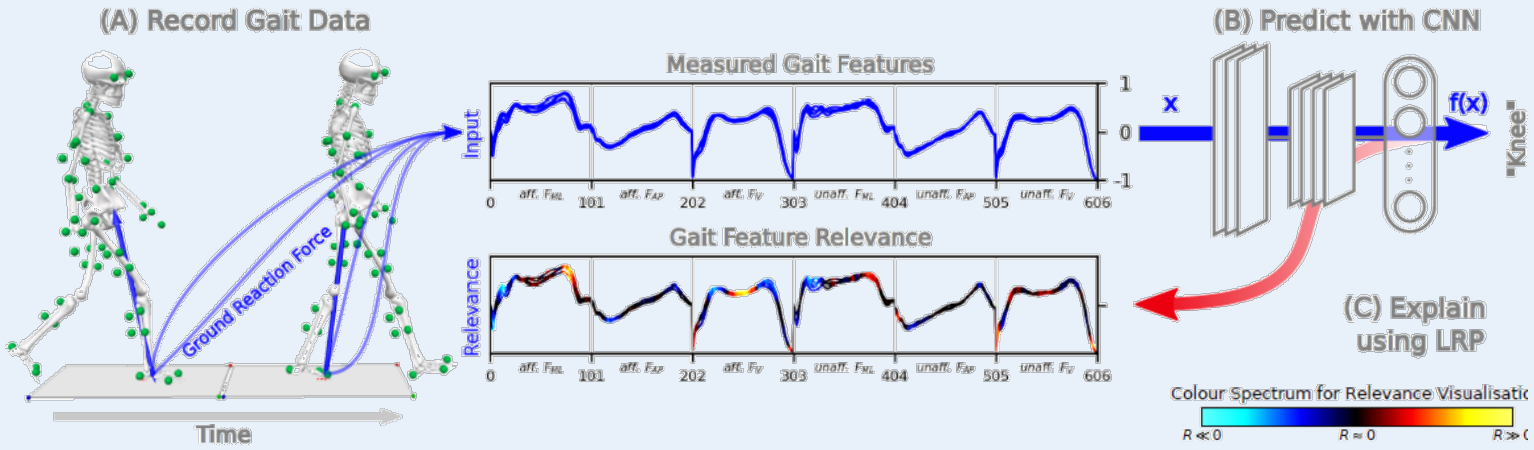
Selected examples

Explainable AI

Trustworthy AI

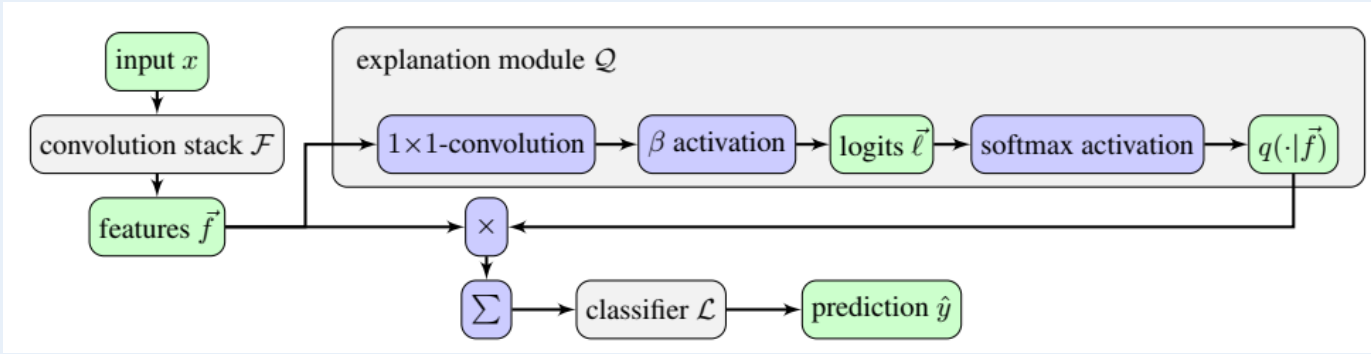
AI for cultural heritage

Explainable AI

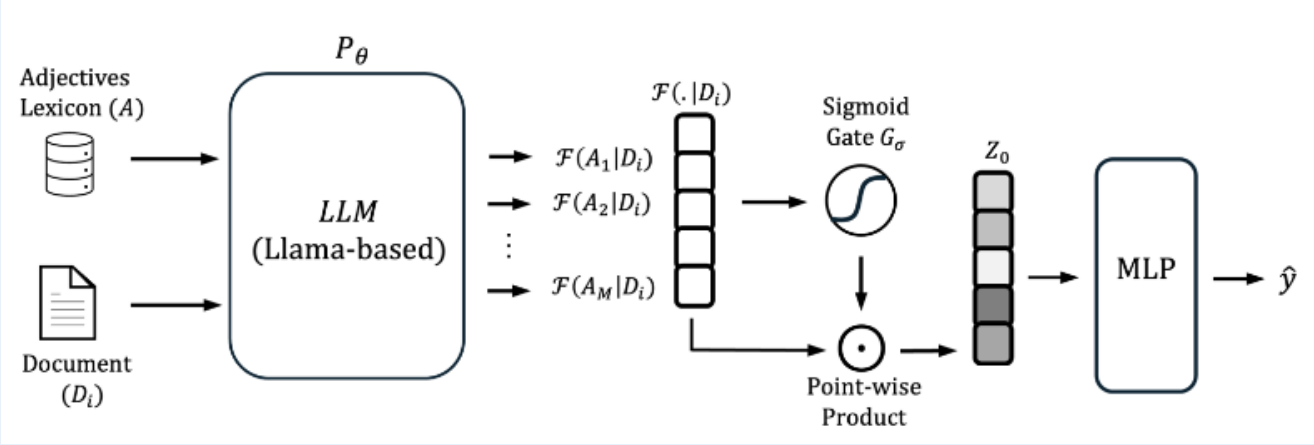


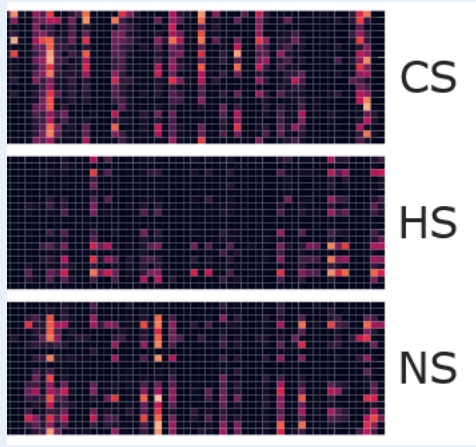
Explain Medical Decision Makers on Time Series Data

Explain Predictions of Visual Classifiers



Explainable AI





Explain Textual Categorizations

Class	Input	Adjectives
Counter-speech	CONTEXT: From what I read the movie is severely inaccurrate and the only redeeming feature is Rami Maleks performance. COMMENT: I wasn't familiar enough with Queen to spot the inaccuracies, so I enjoyed it a ton.	differentiating, moderating, conciliatory, amused, promoting, admiring, exclusionary, respectfully, balancing, emotionally

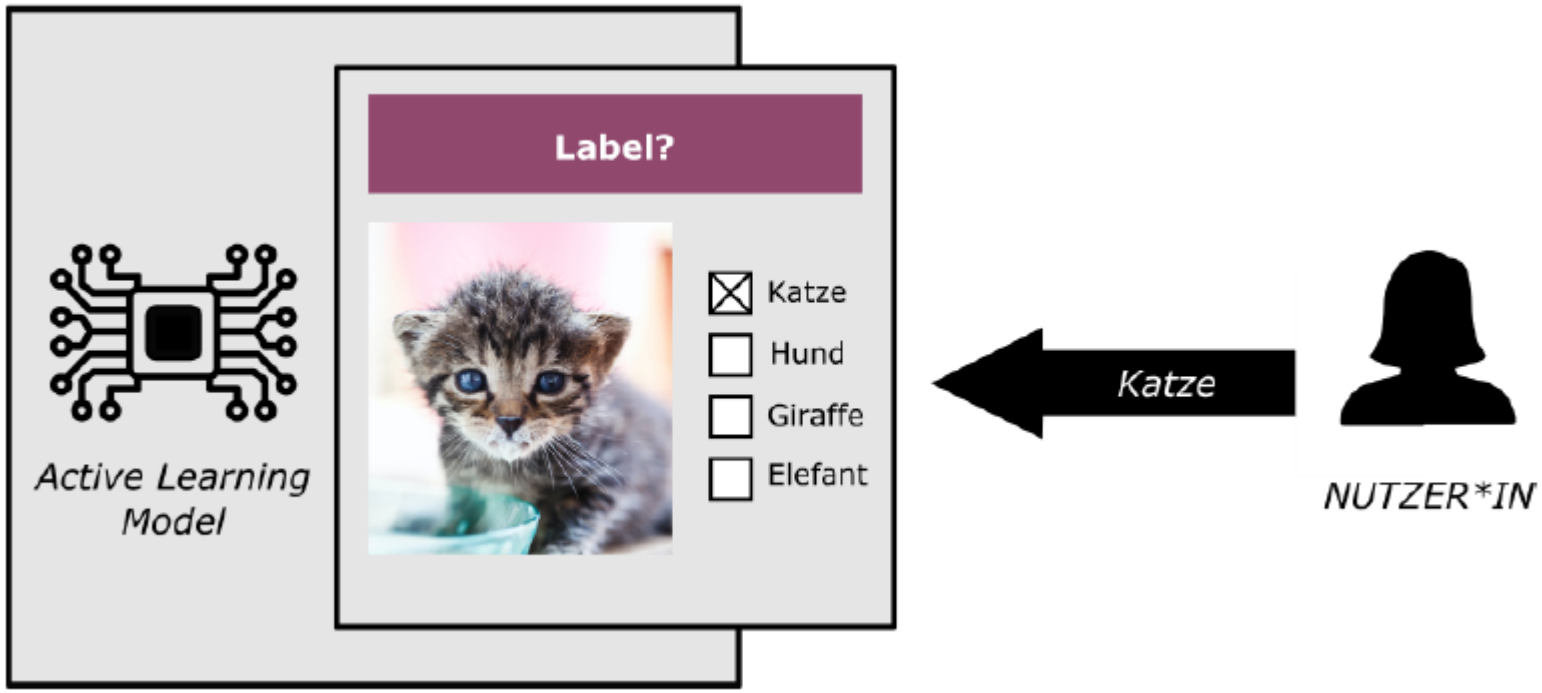
Class	Input	Adjectives
Hate Speech	CONTEXT: Damn, this is some cringey neckbeard shit Y'all lived up to my expectations and didn't disappoint hit me up if you wanna know how a vagina feels COMMENT: You're a fucking retard	hurtful, gender discriminatory, inappropriate, unacceptable, exclusionary, hostile, disrespectful, abusive, insensitive, sexist

Trustworthy AI

Problem: ML lacks transparency and trustworthyness

Idea: build trust via human-AI collaboration

State of the art: AI asks user, user acts as oracle and provides answer → no mutual understanding / no real collaboration



Trustworthy AI

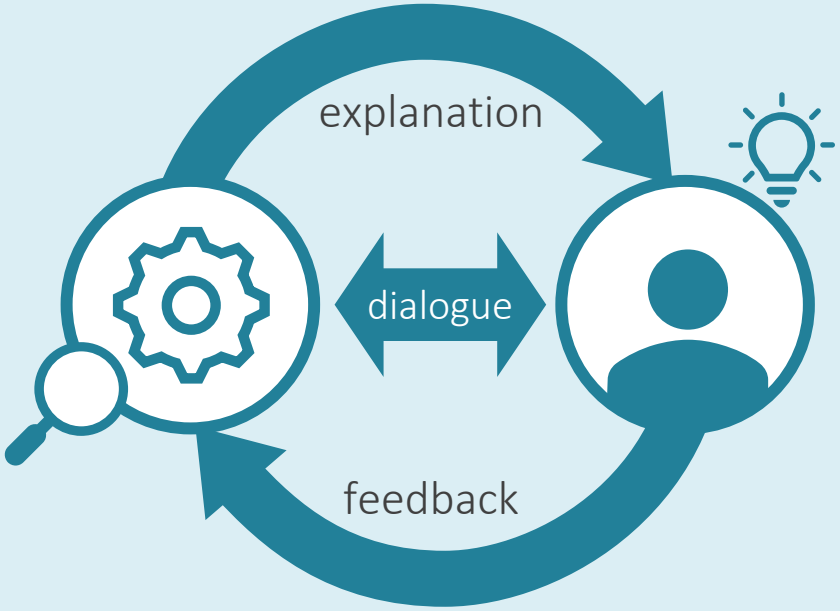
Idea: Integrate Human-in-the-Loop Learning with eXplainable AI

Novelty

- **Bi-directional** communication via explanations
- Iteratively build **trust** & detect **bias**
- Expert **knowledge** guides learning
- **Situation-aware** multi-turn dialog steered by agent

Result

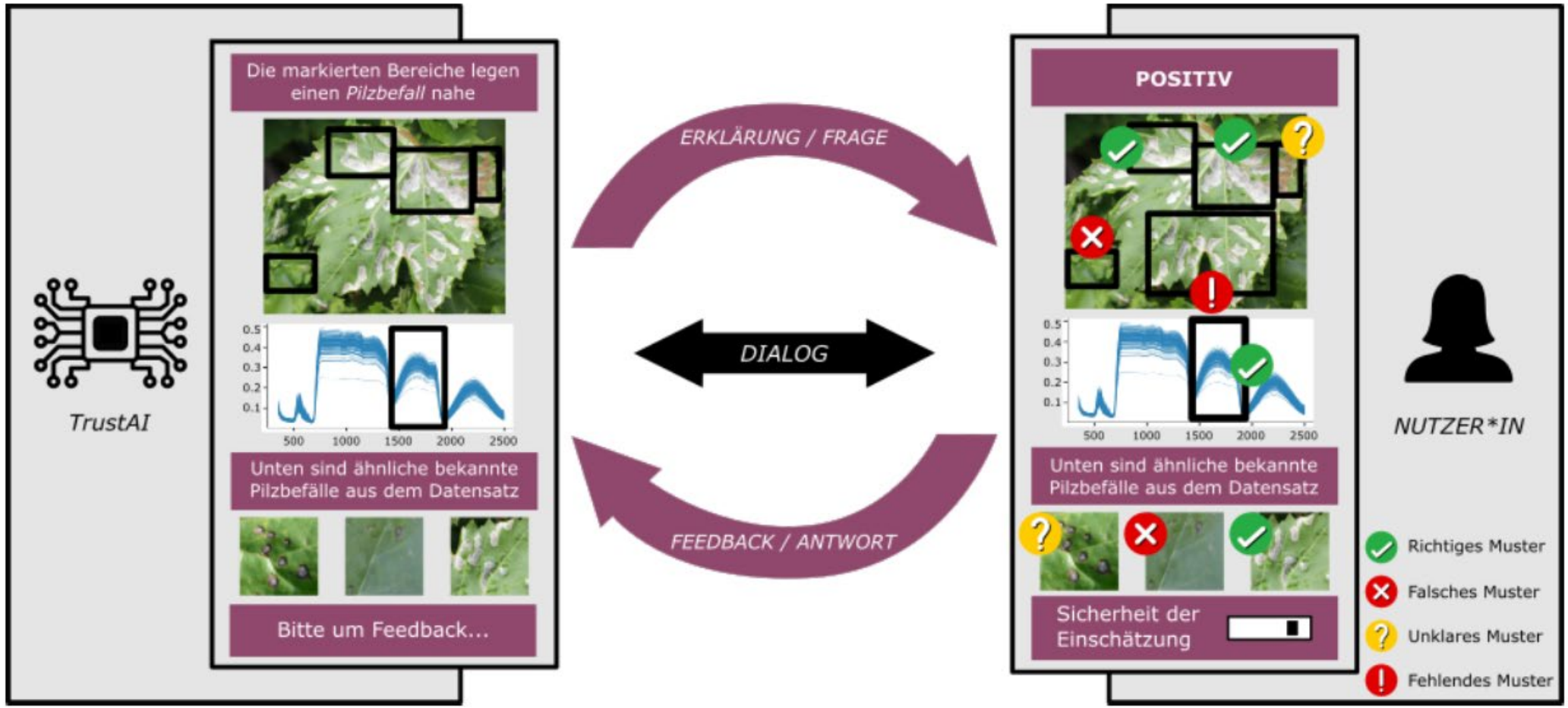
- **Higher semantic level** of communication
- **Trustworthy models**



Application domains:
e.g.: medical imaging, cultural heritage

Trustworthy AI

Establish an interactive AI service platform (AI as a service) for our partners



doc.funds.connect Proposal

Visual Analytics and Computer Vision Meet Cultural Heritage (VaCoViCu)

Interactive Analysis, Exploration, and Presentation of Historical Visual Media Collections

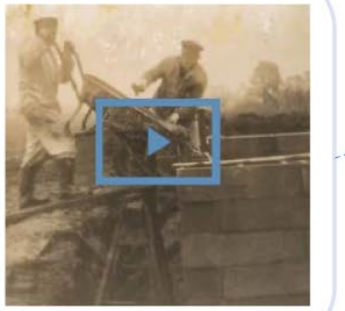
Cooperative doctoral programme combining Computer Vision and Visual Analytics

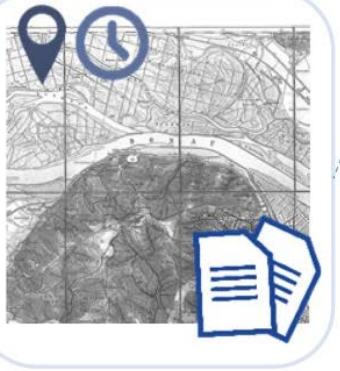
Start: Fall 2023

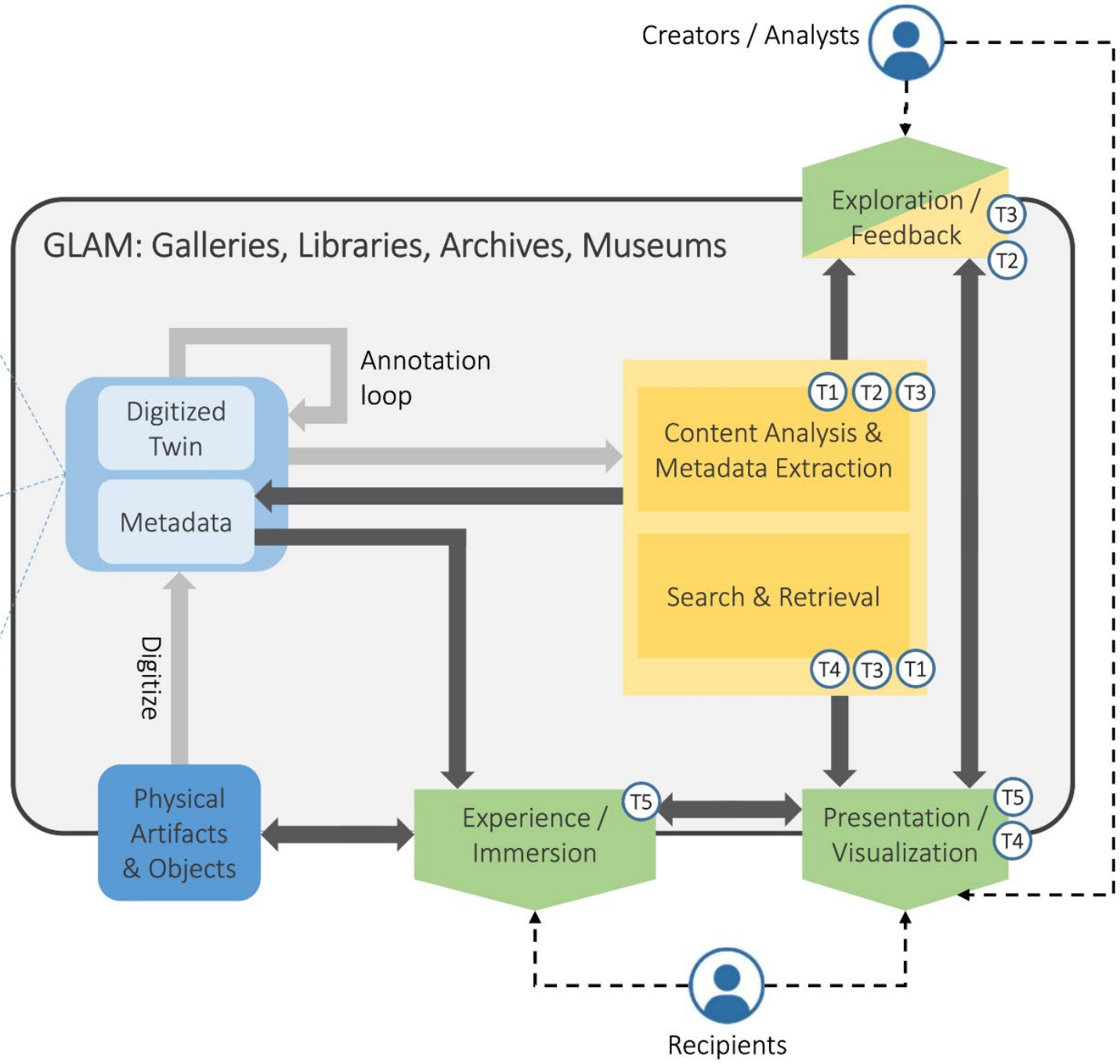
TU WIEN
TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

St. Pölten University of Applied Sciences
/ medien & digitale technologien
/fh/// st.pölten

historical photos
and amateur films



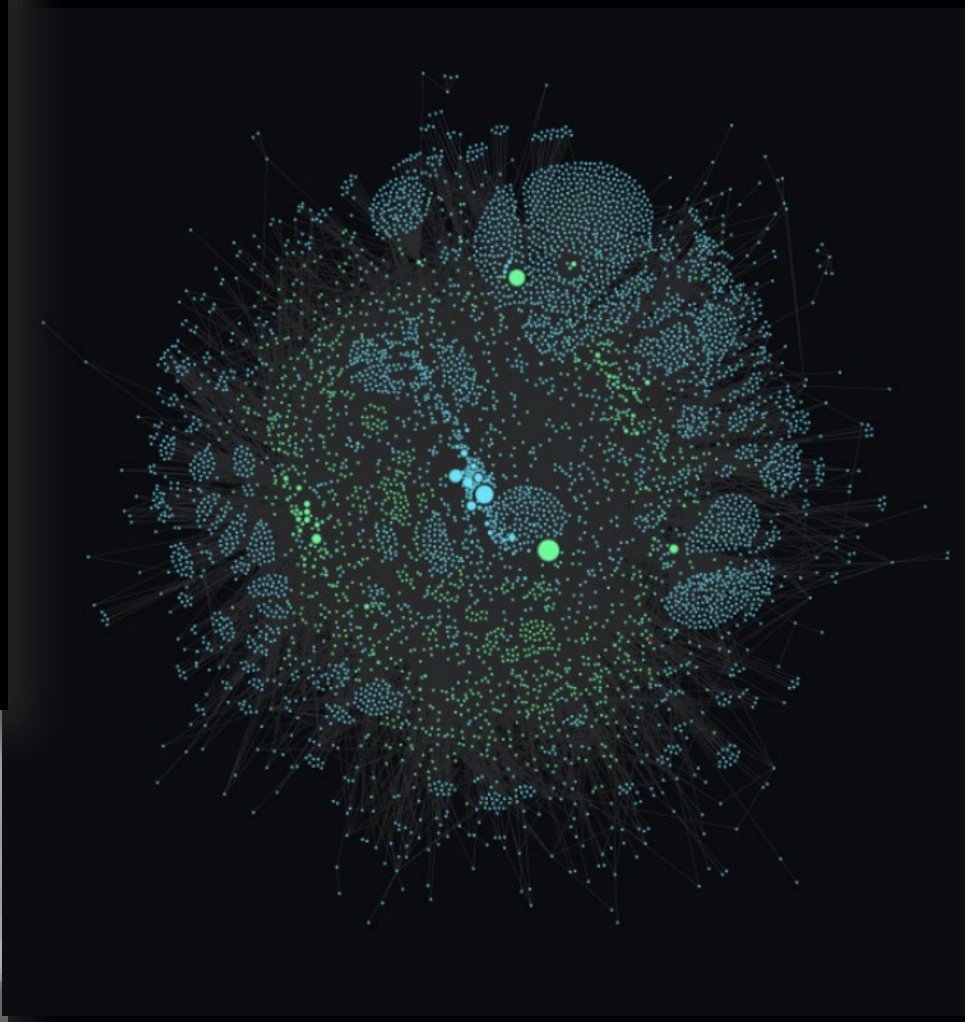




Multi-disciplinary visual computing approach for digital cultural heritage research

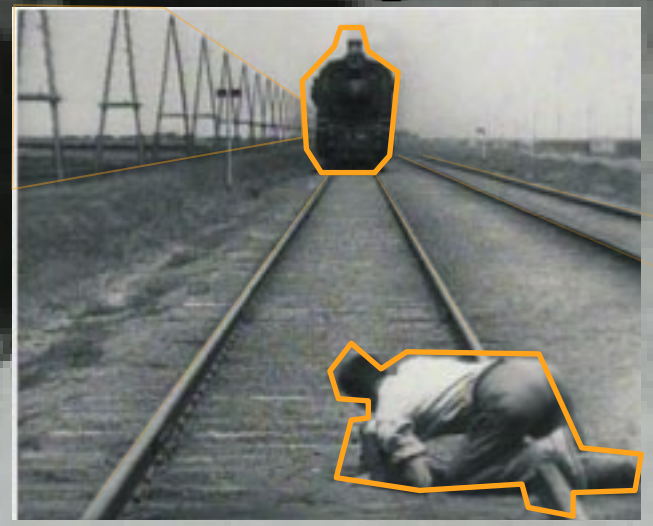
covering

- data acquisition and annotation
- content indexing and modeling
- automatic search and content retrieval
- visual interactive interfaces



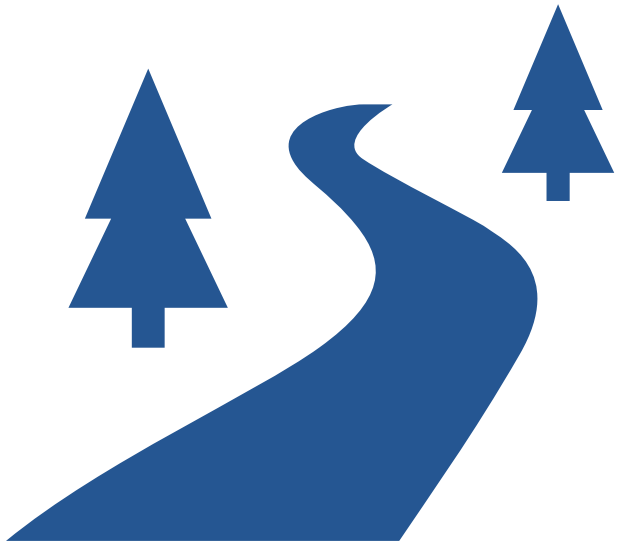
“Locomotive Class L”

“Man with a movie camera”



“probably 1920ies”

Conclusion & Outlook



CAI unifies all AI research at UAS St. Pölten

Five pillars

Focus on collaborative and trustworthy AI

CAI fosters internationalization of research and teaching

Open for collaboration → projects, initiatives, teaching...

Shape further development of human-centered AI solutions and bring real benefit to people, society and environment via AI