AI4DiTraRe: Studying Applied AI Within the Process of Digitalisation of Research

Leibniz ScienceCampus
Digital Transformation of Research

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E-Science-Tage, 12th-14th March 2025, Heidelberg

DiTraRe = Digital Transformation of Research

Leibniz Science Campus

Leibniz ScienceCampus
Digital Transformation of Research

Growth core to **establish new research branch**.

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+
Karlsruhe Institute of Technology (KIT)

- Planned as a **4+4 years** project (start: September 2023).
- Analyse the process of **digitalisation of research**.
- Multilevel **interdisciplinary** approach.

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AI4DiTraRe: develop solutions based on different AI methods to solve research questions in numerous areas of research. Study influence and effects of AI.

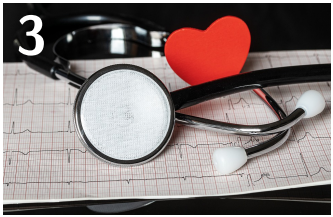
DiTraRe Use Cases

Sensitive Data in Sports Science

KIT Institute of **Sports and Sports Research**

Chemotion Electronic Lab Notebook

KIT Institute of **Biological and Chemical Systems**



AI in Biomedical Engineering

KIT Institute of **Biomedical Engineering**

Publication of Large Datasets

KIT Institute of **Meteorology and Climate Research**

UC1: Sensitive Data in Sports Science

- MO|RE database – a platform to collect, publish, and share motor performance data.
- Connections between motor performance and other health indicators – use KonsortSWD data.

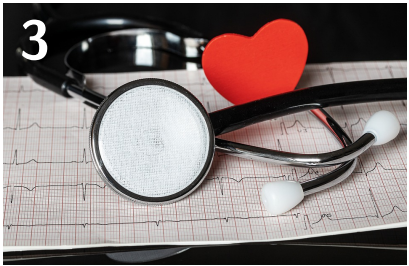
→ *AI4DiTraRe goal in UC1: Create a knowledge graph for enhanced data analysis and interpretation, structuring the data, adding semantics.*

UC2: Chemotion Electronic Lab Notebook

- Electronic Lab Notebook – for chemistry lab data management.
- Chemotion – a multi-level platform for chemists, ELN and a repository.

→ *AI4DiTraRe goal in UC2: Create a knowledge graph and design an ontology for the Chemotion data repository.*

UC3: AI in Biomedical Engineering



- Simulations and computational modelling of a human heart.
- Electrocardiogram (ECG) studies: amplified P-wave is connected to some heart diseases.

→ *AI4DiTraRe goal in UC3: Support automatisation of an amplified P-wave detection by using different machine learning algorithms and large language models.*

UC4: Publication of Large Datasets (climate research)

- Metadata chaos in climate repositories: non-uniform and very often non-standardised.
- Extremely large sizes make it additionally challenging.

→ *AI4DiTraRe goal in UC4: Support creation of a uniform data management platform by creating a large language model based tool for information extraction.*

Summary

- DiTraRe = Digital Transformation of Research.
- Ongoing interdisciplinary research.
- **Role of AI** within the process of digitalisation?

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→ DiTraRe Symposium: December, Karlsruhe, Germany

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Thank you for your attention! ☺

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