HeAT: The Helmholtz Analytics ToolKit
Simulation and Software Technology
High-Performance Computing

Helmholtz Analytics Framework
Joint effort of all 6 Helmholtz centers
Aim: foster data analytics within Helmholtz
Systematic development of domain-specific data analysis techniques in a co-design approach between domain scientists and information experts

Common components for data analysis
- Generalizing and standardizing data analytics, machine learning and deep learning approaches for high performance computation
- Guided by use cases from different scientific fields
- Facilitating use-cases by identifying and providing common components for data analysis
  Clustering, Uncertainty Quantification, Dimension Reduction, Feature Learning, Data Assimilation, Classification / Regression, Modelling, Optimization Techniques, Hyperparameter Optimization, Interpolation, Data Mining

Helmholtz Analytics ToolKit
Scientific data analytics library for HPC systems
- build on top of PyTorch
- Operates on heterogeneous hardware like GPU/CPU systems
- Allows computation on distributed systems
- Distributed tensor data object: operations like basic scalar functions, linear algebra algorithms, slicing or broadcasting operations

Clustering of Combustion Data
Hybrid rocket engines: paraffin-based fuel with gaseous oxidator
Combustion tests at DLR Institute of Space Propulsion
Super-high resolution video camera (10 000 images / second)
Clustering of Images for identification of combustion phases → Kmeans

Open Source
https://github.com/helmholtz-analytics

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