Research associate / PhD candidate (f/m/d)
Simulation-based Machine Learning and Data Analysis framework for X-ray Imaging

Job description: State-of-the-art machine learning methods are desirable for processing large series of X-ray image data (Terabytes/week), routinely acquired at synchrotrons, in order to drastically reduce the time scientists typically need to process and analyze such tremendous data amounts. Synchrotron based high-throughput and real-time X-ray imaging (including tomography) could then reach its full potential in rapid X-ray diagnostics in material research, life sciences and quality assurance. Such methods often require sophisticated data acquisition and data processing pipelines composed of advanced pre-processing, 3D reconstruction, semantic segmentation, etc. The aim is to develop and employ X-ray imaging simulation framework to create realistic training data sets, which will be augmented by the real tomographic data providing a mixed - real and synthetic - training database which will be used to machine learning and data analysis methods.

Figure: X-ray imaging setup (left), tomographic slice of a model organism (center) semantic segmentation of internal structures (right)

In this work you will further develop and employ simulation framework syris developed at KIT in order to:

- Investigate common challenges for 3D and 4D X-ray imaging data processing (incl. 3D reconstruction, semantic segmentation, artifacts removal)
- Design synthetic data sets which represent such problems
- Implement image metrics and workflows for systematic evaluation
- Apply state-of-the-art Machine Learning methods for various applications
- Benchmark selected Machine Learning methods using the developed evaluation workflows
- Implement refined algorithms using OpenCL and integrate them into DAQ protocols
- Establish an online, open-access database of simulated X-ray datasets

What to expect:

- Interdisciplinary environment consisting of physics, biology and computer science specialists which enables fast professional growth in multiple directions
- Work with state-of-the-art technology on several pioneering projects
**Qualification:** The following qualifications are required seeking your consideration for this position:

- Master’s degree in Computer Science
- Machine Learning, Deep Learning, knowledge of ML frameworks
- C/C++ and Python; OpenCL / CUDA and knowledge of Image processing is beneficial
- Fluency in spoken and written English

**We offer:** We offer an attractive and modern workplace with access to excellent facilities of KIT, diverse and responsible tasks, a wide scope of advanced training options, supplementary pension with the VBL (Pension Authority for Employees in the Public Service Sector), flexible working time models, a job ticket (BW) allowance, and a cafeteria/canteen.

**Salary:** The remuneration occurs on the basis of the wage agreement of the civil service in TV-L, E13.

**Institute:** Laboratory for Applications of Synchrotron Radiation (LAS)

**Contract duration:** limited to three years

**Starting date:** As soon as possible

**Application up to:** 15.09.2019

**Contact person in line-management:** For further information, please contact Dr. Alexey Ershov, phone +49 721 608-26864, E-Mail: ershov@kit.edu.

**Application:** Please send the full application with a motivation letter, curriculum vitae, copies of academic degrees and transcripts of records as a single PDF file before September, 15th 2019 to Ms. Esra Aran, E-Mail: esraaran@kit.edu.

We prefer to balance the number of employees (f/m/d). Therefore we kindly ask female applicants to apply for this job.

If qualified, severely disabled persons will be preferred.

**Karlsruhe Institute of Technology Personalservice** KIT is certified as a family-friendly university (familienfreundliche Hochschule) and offers part-time employment, leaves for family-related reasons, dual career options, and individual coaching for family-work balance.