



Karlsruhe Institute of Technology

Karlsruhe Institute of Technology
Personalservice (PSE)

Kaiserstraße 12
76131 Karlsruhe

<http://www.pse.kit.edu>

Research Associate / Ph.D. candidate (m/f/d) Deep Learning for High-Throughput X-ray Tomography

Job description:

Enormous progress in synchrotron based x-ray tomography opens new routes for high-throughput and ultrafast x-ray diagnostics in materials research, quality assurance, and life sciences. With current imaging setups a tremendous amount of heterogeneous raw data is generated. This makes the image analysis and interpretation process an ultimate bottleneck for broad technological breakthroughs. To overcome this bottleneck, the work aims to leverage the recently emerged machine learning methods as a powerful tool for 3D/4D data processing and analysis of tomographic data. Recent results indicate that the generic descriptors extracted from deep convolutional neural networks (CNN) are extremely effective in object recognition and localization. The aim of this work is to develop a general purpose framework for segmentation and analysis of heterogeneous 3D/4D tomographic data.

This includes:

- Investigate the state-of-the-art segmentation and object recognition techniques based on machine learning methods and in particular on deep convolutional neural networks (CNN).
- Investigate and develop high level features for learning and classification (e.g. atlas-based, predefined morphological features).
- Implement transfer learning and adaptive selection of trained models based on characteristics of input data.
- Investigate a possibility to apply reinforcement-like learning based on the user feedback.
- Implement methods to detect data outliers and deviations (e.g. image artifacts or anatomical abnormalities) employing trained data and high level features descriptors.
- Implement approaches which are robust to noise, image artifacts and contrast changes (e.g. imaging modes, different contrast agents).
- Design and employ synthetic datasets with simulated structures and textures to perform training and data augmentation.
- Application and evaluation of the developed framework on various datasets from different application fields.

Qualification:

The following qualifications are required seeking your consideration for this position.

- Programming skills in C/C++ and Python languages
- Passion for image processing and data analysis
- Knowledge of machine learning techniques
- Knowledge of data analysis and machine learning frameworks (numpy, scikit-learn, etc) is beneficial
- Experience with OpenCL / CUDA is beneficial

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: 17.01.2019

Contact person in line-management: For more information please contact Dr. Alexey Ershov, E-Mail: ershov@kit.edu

Application: Please send only complete applications including CV, motivation letter, copies of academic degrees and transcripts of records as a single pdf file by email to Ms. Esra Aran (Email: esra.aran@kit.edu)

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

If qualified, handicapped applicants (m/f/d) will be preferred.

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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.