We combine excellence in research, teaching, and patient care. The **University Hospital Bonn (UKB)** is a maximum care hospital with more than 1,300 beds. With around 38 clinics and 31 institutes as well as more than 8,000 employees (over 5,000 full-time staff), the UKB is one of the largest employers in Bonn. Every year, the UKB treats around 50,000 inpatients and around 35,000 emergencies, as well as provides over 350,000 outpatient treatments.

The following **full-time (38.5 hrs./week) Ph.D. position** is available at the **Computational Imaging Research (CIR) Lab**, headed by Prof. Dr. Shadi Albarqouni, in the **Clinic for Diagnostic and Interventional Radiology** of the University Hospital Bonn, University of Bonn:

Ph.D. position in
Computational Medical Imaging – Affordable Federated Learning (m/f/d)

starting October 2022 or as agreed upon. The position is initially limited to three years, with the possibility of extension.

The Ph.D. position will be based in the newly founded research lab for Computational Imaging Research (CIR), which **aims to develop** i) fully automated, highly accurate **innovative computational methods** that save expert labor and efforts, and mitigate the challenges in medical imaging; namely the availability of a few annotated data, low inter-/intra-observers agreement, inter-/intra-scanners variability and domain shift, ii) innovative **deep Federated Learning algorithms** that can fairly distill and share the knowledge among AI agents in a robust and privacy-preserved way, and iii) **affordable AI algorithms** suitable for low-quality data generated by low-resource settings and point-of-care devices. As AI technology becomes the de facto knowledge discovery approach in many industries including Healthcare, **federated learning (FL)** has emerged as a key factor to be considered for the future of digital health. With FL, collaborative learning without a centralized data lake is enabled and has already been adapted to digital health applications. In this project, we aim to broaden and strengthen our knowledge in the area of **affordable FL** where models are trained and deployed in low-resource settings. The Ph.D. candidate will have the chance to test the developed affordable AI algorithms in low-resource settings and closely work with our clinicians to identify the clinical use cases. The Ph.D. candidate will be enrolled in the Faculty of Mathematics and Natural Science at the University of Bonn. If you have experience with computational methods in medical imaging, this is a great opportunity to be part of our team and contribute to AI in Medicine.

Your responsibilities:

- Build and create a few clinical use cases for benchmarking existing state-of-the-art (SOTA) FL algorithms. This includes running baselines and pre-/post-processing pipelines
- Develop innovative computational algorithms for affordable, scalable, and efficient FL models via knowledge distillation, pruning, and/or quantization methods
- Potentially, test and deploy the developed algorithms in low-resource settings
- Publish and present scientific outcomes at Intl. conferences and high-impact journals
- Maintain close collaboration with the team members and clinical partners

Your qualifications:

- M.Sc. in Computer Science, Machine Learning, or equivalent with an interest in Medical Imaging
- Strong knowledge in Machine/Deep Learning with experience in annotation-efficient deep models, e.g., unsupervised and semi-/self-supervised learning

- Excellent programming skills in Python and PyTorch including fundamental software engineering principles and machine learning design patterns
- Excellent analytical, technical, and problem-solving skills
- Be highly motivated and a team player with excellent communication and presentation skills, including experience in communicating across discipline boundaries
- Fluent command of the English language

Desirable qualifications:

- Track record of publications at top-tier conferences and high-impact journals in the field
- Hands-on experience with Federated Learning frameworks
- Hands-on experience with the MONAI framework (https://monai.io/)
- Working in a Linux environment, with experience in shell and cluster (SLURM) scripting
- Fluency in spoken and written German

What we offer you:

- **A secure future:** remuneration according to the German salary scale TV-L (E13)
- **Flexible for families:** flexible working time, home office, onsite nursery, and parental care.
- **Provisions for later:** company pension scheme
- **Discounted public transport ticket**: discounted ticket for public transport (VRS)
- **on-site health management service:** Numerous health promotion offers
- **Employer benefits:** Discounted offers for employees
- Subsidized **continuing education and training**

The University of Bonn is committed to diversity and equal opportunity and is certified as a family-friendly university. It aims to increase the proportion of women in areas where women are under-represented and to promote their careers in particular. Therefore, we strongly encourage applications from qualified women. Applications will be handled in accordance with the State Equality Act (Landesgleichstellungsgesetz). Applications from individuals with a certified severe disability and from those of equal status are particularly welcome.

Contact:

If you meet the requirements and you are looking for a challenging job? Do not hesitate and send your application including a cover letter (highlighting your qualifications), a detailed CV (with links to previous projects and code repositories), scanned academic degrees, and the contact details of two referees (preferably by e-mail in a single PDF file up to 5 MB in size) by **15th January 2023,** quoting the job advertisement no. **CIR/01/2023** in your email's subject to:

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