PhD Scholarship

The international Graduate School for
Medical Engineering and Engineering Materials

http://www.memorial.ovgu.de/

Module M1.10 | Deep learning for interventional C-arm CT

The CT reconstruction task, addressing the determination of an underlying 3D volume from a series of projections, corresponds to the solution of a huge system of linear equations. Modern deep-learning methods provide an effective tool to perform such tasks. To date, CT scans always acquire a complete set of x-ray projections of the examination object disregarding the fact, that it might be about one and the same patient being multiply and/or repeatedly screened. Moreover, complete CT scans result in identically high doses of ionising radiation as well as long scan durations. Prior knowledge e.g. including generalisable information on human anatomy or even the availability of individual data based on previous, patient-specific scans is presently not taken into account. This holds particularly true for image-guided interventions such as inserting a needle into a tumour for the purpose of ablation. The associated exposures only differ with respect to the needle's position - an information being derivable also from a single projection within the scope of a suitable setting.

The aim of this sub-project is to study, whether CT reconstruction by means of deep learning methods allows for the imaging and detection of very small changes of the scene based on a number of relevant projections as minimal as possible. If applicable, significantly reduced radiation doses linked to shorter scan times may result, enabling the real-time imaging during interventions.

Graduates ...

- holding a Master's degree or equivalent in
  - ++ computer science,
  - ++ medical engineering,
  - ++ engineering science, or
  - ++ natural science,
- featuring programming skills (e.g. C/C++; with hands-on experience or at least interest wrt GPU programming being advantageous!),
- being familiar with or at least interested in (i) computed tomography (CT) reconstruction as well as medical imaging and/or (ii) artificial neural networks/deep learning, and
  featuring English language skills adequate to communicate, give presentations, and publish in English

while ...

- being keen on joining an interdisciplinary team of enthusiastic, goal-driven, internationally well-established, and highly interconnected researchers and excellent PhD students in the field of medical and materials engineering,
- being seriously intended to successfully take their doctoral degree by no later than Apr-30, 2022 (end of the max. funding period) within the scope of a structured PhD program not least affording for/focussing on individual progression wrt specialist & technical know-how, and scientific soft-skills

Applications...

- Deadline: **May-07(Mon), 2018 (23:59 CEST)**
- Application procedure:
  http://www.memorial.ovgu.de/Module+1/M1_+Sub_Projects/M1_10/M1_10_call4app-p-236.html