

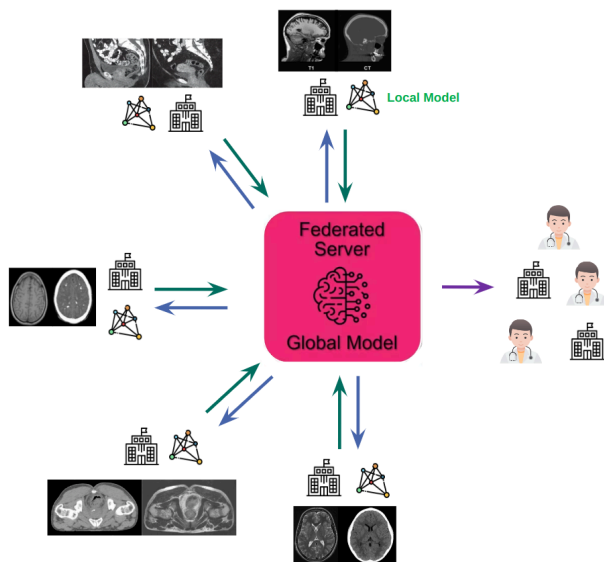
Bachelor Thesis

Validating the Robustness of a Decentralised MRI to sCT Translation Framework on Different Anatomical Sites

M. Sc. **Ciro Benito Raggio**, Prof. Dr.-Ing. Spadea

Motivation

Federated Learning (FL) presents a promising approach for training artificial intelligence models within the medical domain, particularly by safeguarding patient privacy through decentralised data processing. A decentralised framework has been developed for translating MRI into synthetic Computed



Tomography (sCT) images. While initial assessments have demonstrated its feasibility on head MRI, the performance and robustness of this framework across diverse anatomical sites remain unvalidated.

Different anatomical structures present different challenges, which may impact the reliability of the federated model.

How does the

inclusion of multiple anatomical sites affect the performance and generalisability of the federated MRI-to-sCT translation framework?

Student Project

The objective of this project is to evaluate the robustness of the MRI-to-sCT translation framework by testing its performance on various anatomical sites, such as the brain and pelvis. This validation will involve evaluating generated sCT, assessing image similarity metrics and generalisation capabilities across different anatomical regions. Through this study, insights will be gained into potential adaptations required to ensure consistent performance across diverse body parts, thus advancing the framework towards broader clinical application.

Notes

- Python or programming knowledge is a plus. Knowledge of medical imaging is a plus.
- All missing skills will be integrated during the first period of the thesis with dedicated sessions and goals.
- The student will have the opportunity to learn how to manage a project with SCRUM and GitFlow methodologies.

Research Area

Medical Imaging for Modeling and Simulation

Project

Decentralised approaches to training AI models in healthcare

Orientation

Medical Imaging, Software Programming, Simulation

Course of studies

Electrical Engineering and Information Technology, Biomedical Engineering, Computer Science

Starting Date

As soon as possible



Contact person

M. Sc. **Ciro Benito Raggio**
Geb. 30.33, Raum 508
Fritz-Haber-Weg 1 76131
Karlsruhe
eMail ciro.raggio@kit.edu