External master thesis project at Brainlab AG

Research question: Can equivalent uniform dose predict radiation necrosis for stereotactic radiosurgery of brain metastases?

Project description:
Brain metastases can be effectively treated using stereotactic radiosurgery (SRS). However, high dose is inevitably delivered to healthy brain tissue as well, which is known to be related to radiation necrosis. The steadily increasing number of treated and re-treated patients potentially allows for radiobiological modelling of such complications. Such models could be utilized to further reduce the toxicity of SRS.

In this work, equivalent uniform dose (EUD) shall be utilized to model the normal tissue complication probability (NTCP) of radiation necrosis locally. A version of EUD which accounts for multiple lesions shall be implemented in an existing framework for treatment plan evaluation. The software shall subsequently be utilized to define model parameters and validate the model on clinical data from the University Hospital, LMU Munich.

Project logistics:
The thesis will be carried out at the Brainlab AG in the RT Planning R&D department in close collaboration with the LMU Munich University Hospital, and will be supervised at the Physics Faculty of LMU Munich.

What should the student bring:
- Bachelor in physics / computer science / other engineering

- Ideally specialization in medical physics

- Project experience with Python (for analysis and validation)

- First experience in C++ (for extension of EUD model and data export)

- Expected duration: 12 months (6 months practical phase, 6 months Master thesis)

Contact:

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