



Project for Master Thesis

Large scale data collection and analysis in Radiation Oncology

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Motivation:

Radiation therapy is a key treatment modality and strong pillar in cancer management. Due to the high complexity of modern treatments, the extensive monitoring and subsequent follow-up of the patients a massive amount of partly heterogeneous data is generated. A typical case in radiation oncology does not only consists of demographic data, but includes volumetric imaging data of the patient in treatment position combined with the volumetric information of the dose distribution of radiation dose, as well as a large amount of other medical data (e.g. from pathology, diagnostic radiology, medical oncology) at time of diagnosis and during follow-up. The handling of this information is challenging and is often overwhelming for manual inspection by the physician.

Big Data analytics can be a powerful tool in developing predictive models with the aim of guiding treatment decisions for patients undergoing external beam radiotherapy. However, much of the data generated around patients is collected and stored in a heterogeneous form and is not suitable for documentation and analysis.

The main aim of this thesis will be the collection and pre-processing of radiotherapy related data. In a second step, the data will be analyzed using machine learning techniques with the aim of investigating possible autonomous support systems for treatment decisions.

Work Description:

- Development of software tools to collect, pre-process and store data in a database
- Data analysis using machine learning methodologies (radiomics, deep learning)

Qualifications:

- Student of computer science, physics, biomedical engineering or similar technical studies
- Programming experience in MATLAB, Python and/or C++
- Written English skills for documentation and reports

Duration: 9 months, the position is open now (08/2017)

If you are interested in the topic please send an email to hugo.furtado@meduniwien.ac.at, gerd.heilemann@meduniwien.ac.at or dietmar.georg@akhwien.at.