Title: High-performance Medical Image Registration in TensorFlow

Keywords: medical image registration, deep learning, tensorflow

Description:

Do you want to develop the new state-of-the-art medical image registration algorithm and compete with today's established software packages at the prestigious [Workshop on Biomedical Image Registration 2018](#) (WBIR2018) in Leiden, Netherlands? Then this project is for you. You will get a working prototype implemented in TensorFlow, which you will improve using a deep-learning based transformation model. Or a deep-learning based optimizer. Or whatever you can come up with. You will then enter a grand challenge on lung registration and beat elastix, NiftiReg, ANTs and all the others at their own game.

TensorFlow is Google's open source library for machine learning that powers many of their internal projects. For example, Google uses TensorFlow for search ranking, translation, and image classification. In this project, you will take advantage of the enormous efforts that went into developing TensorFlow and apply it to medical image registration. Image registration is the process of transforming images into a common coordinate system so pixels represent corresponding anatomical points. It is one of the most fundamental tools in image-based research and diagnostics, and the method you develop in this project may potentially enable real-time intra-operative registration, novel computer aided diagnosis (CAD) methods, and medical image processing on a previously unseen scale (think thousands of GPUs).

Combining deep learning with medical image processing is one of the hottest research topics in the medical imaging community at the moment. If you want to be on the forefront of medical imaging research, then this project is for you.

Required Qualifications:

- Introduction to programming and data processing (02631, 02632, or 02633)
- (Optional) Deep Learning (02456)
- (Optional) Advanced Machine Learning (02460)
- (Optional) Programming in C++ (02393)

Responsible Institution: DTU

Suggested DTU supervisor: Kasper Marstal*, PhD student,

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Allowed number of students: 1-2

The project description may be published on website: Yes