Master project assignment:  
Efficient, robust and reliable interpolation for therapy planning applications

Philips Research

Company description:  
Philips Research is a global organization of ~1200 people that helps Philips introduce meaningful innovations that improve people’s lives. We provide technology options for innovations in the area of health and well-being. Positioned at the front-end of the innovation process, we work on everything from spotting trends and ideation to proof of concept and first-of-a-kind product development (more info: www.research.philips.com).

Project description:  
This project is part of a large ongoing effort aiming at developing a therapy planning tool for tumor ablation (e.g. hepatic) using different modalities (e.g. radio frequency). This tool combines validated numerical models that predict the energy dose delivered and the damage to the tissue with efficient mathematical algorithms enabling real time therapy planning and adaption. The mesh requirements are typically different for the different models developed in the tool as well as for the visualization and manipulation of data. To ensure efficient and accurate communication between these models, robust interpolation routines need to be developed. **Aim of this project is to develop efficient and reliable interpolation routines to be included within the planning tool.**

General:  
The expected duration of the assignment is 6 - 9 months (master). Work is performed at Philips Research located at the high tech campus in Eindhoven, The Netherlands (www.hightechcampus.com). Students will receive a fee during their assignment period and financial support for housing if applicable.
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Assignment requirements:
- Energy/volume preserving interpolation routines
- Quantifiable error
- Sub-sampling & Super-sampling
- Insights in local error (visualization)
  - Volume rendering 3D
  - Vertex / edge / face error
  - Dependencies with input variables 1D
- Increasing level of mesh complexity
  - Structured regular mesh → Structured regular mesh
  - Unstructured mesh → Structured regular mesh
  - Structured regular mesh → Unstructured mesh
- Multi-threading (compatible)

Assignee requirements:
- Good mathematical background
- Familiarity with mesh generation / visualization technologies
- Advanced programming skills with C++
- Good communication skills (English)
- Basic knowledge of bio-heat transfer / soft tissue is not required but it is a plus

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