

Student Research Assistant Position

Developing a Synthetic Data Generation Pipeline for Surgical Navigation



Context

Intraoperative navigation relies on accurate registration between preoperative and intraoperative data to guide surgeons. Deep learning algorithms have been developed to enhance this registration process, but training these algorithms requires large amounts of data. However, real data is often sparse and difficult to obtain. To address this, we focus on generating synthetic data through an advanced simulation pipeline. The pipeline simulates organ deformations under various conditions, enabling the creation of diverse and realistic datasets for training and validating navigation algorithms. It is under active development to meet the training data needs within the group.

Tasks

- Integration of methods into pipeline functionality, method development
- Failure case analysis and mitigation
- Preprocessing of real intraoperative data for validation
- Literature research on datasets and algorithms

Requirements

- Programming experience in Python
- Skill in quickly adapting to new frameworks, interfaces, and concepts
- Literature survey skills
- Optional: Programming experience with the Visualization Toolkit (VTK), SimpleITK, experience with video processing



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