

Anatomical landmark tracking for improved augmented reality-based navigation in laparoscopic surgery

Background

During laparoscopic surgery, also known as “key hole” surgery, the operating site is seen through a camera. Recently, augmented reality systems have been introduced into laparoscopic liver surgery to provide a fused view of the pre-operative model and the real-time laparoscopic video data. The correspondence between these two images is obtained from landmark-based registration. This method is error prone because of liver motion and deformation during the surgery, which causes a shift, resulting in inaccurate registration. Therefore, there is a need to track the registration landmarks to continually update the registration during the surgery.

Aim

To evaluate whether state of the art tracking methods can track anatomical landmarks in liver surgery and update the registration.

Materials and Methods

The candidate will develop a system to interactively track the landmarks and develop a metric to define the robustness of the system. The surgical video data will be used to select a suitable tracking method among the previously developed ones which will be modified and improved according to the surgical needs. This method will then be integrated into the current navigation system and evaluated on a designed phantom against the ground truth data.

Work shares of the Thesis

- Image Processing/Analysis: 50%
- Experimental study: 30%
- Software development: 20%

Skills and interests of the candidate

- Image Processing
- Computer Vision
- Programming skills (Python, C++)



Supervisors

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Examiners

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