

Laparoscopic real-time HSI

Art	Master
Arbeitstitel	Freehand laparoscopic push-broom hyperspectral imaging (HSI) in real-time

Motivation

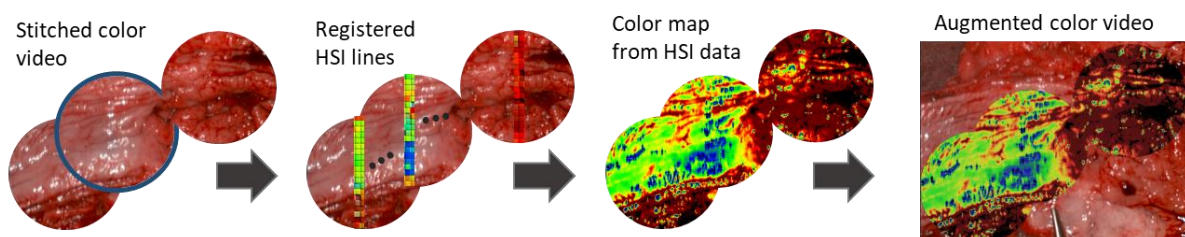
Hyperspectral imaging (HSI) can support intraoperative perfusion assessment, the identification of tissue structures, and the detection of cancerous lesions. The practical use of HSI for minimal-invasive surgery is currently limited, for example, due to long acquisition times, missing video, or large set-ups. The current line-scanning method used for laparoscopic HSI by Diaspective Vision/ICCAS takes more than 5 seconds for data acquisition. Real-time hyperspectral imaging would improve intraoperative usability and increase the clinical acceptance of this technology. Other methods for real-time HSI (spectral scanning, snapshot imaging, ...) have limited spectral or spatial resolution.

Concept

The LYSIS system developed by Diaspective Vision includes a color video sensor and a push-broom spectrograph. Besides the currently used method of moving the spectrograph with an integrated motor, the user could switch to a freehand mode. During this mode, the spectrograph is acquiring only one central line of the image in real-time and the region of interest is manually scanned by the user. Therefore, the images of the color video need to be stitched in real-time and the corresponding HSI data should be visualized as an augmented overlay.

Tasks

- Development of real-time color image stitching based on landmarks or neural networks.
- Implementation of a color image and HSI data registration.
- Visualization of HSI data between stitched color images.
- Development of methods for fading out old data and updating new data depending on manual scanning speed.



Kontakt

Universität Leipzig
Innovation Center Computer Assisted Surgery (iCCAS)
Hannes Köhler
E-Mail: hannes.koehler@medizin.uni-leipzig.de
Web: www.iccas.de