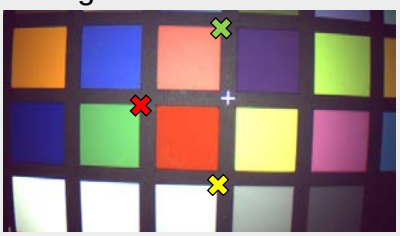
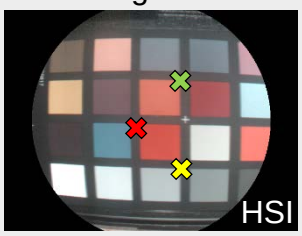
0. Manual registration of the two image sensors (only once)

Image from color sensor



RGB image from HSI



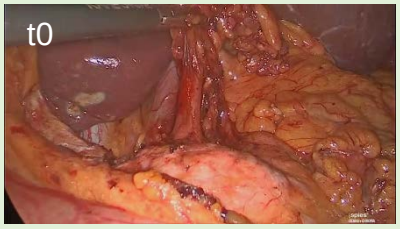
$* H =$

Transformed HSI data

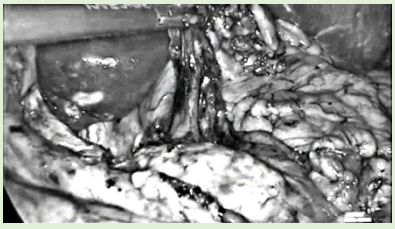
Least square solution for H with RANSAC (SH)

1. Preprocessing, keypoint detection and matching in masked color images

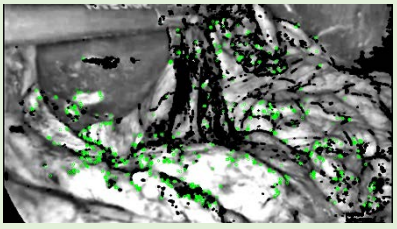
a) Image during HSI record



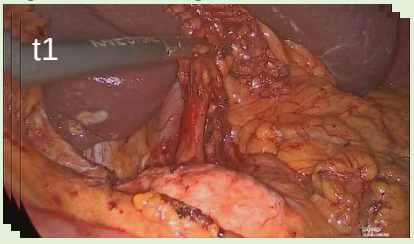
Green channel, Glare mask, Smoothing, CLAHE

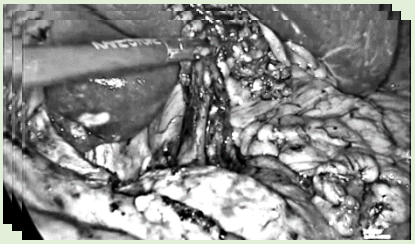


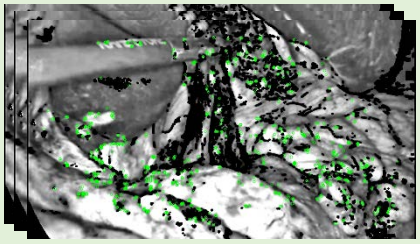
Detect 1000 keypoints in mask, compute descriptors (ORB1000)



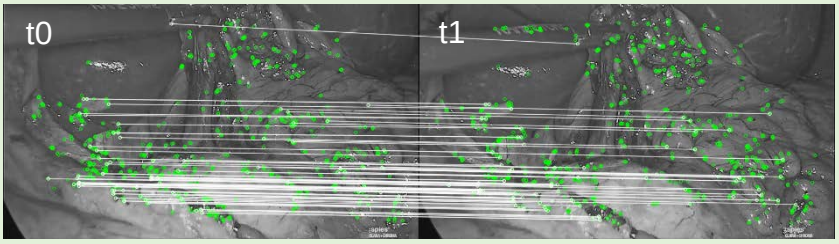
b) Video images







c) Keypoint matching

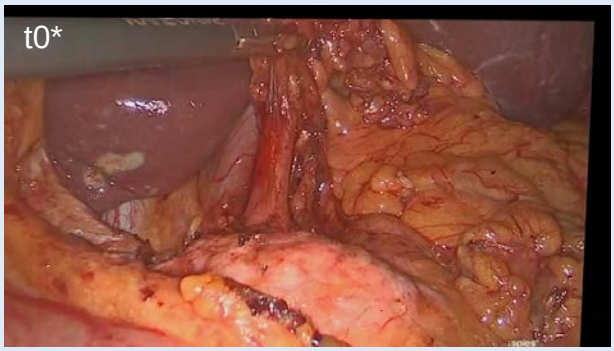


Brute-Force matching (Hamming norm) of descriptors with cross-check and selection of 20% best matches

2. Calculation of transformation matrices from point pairs

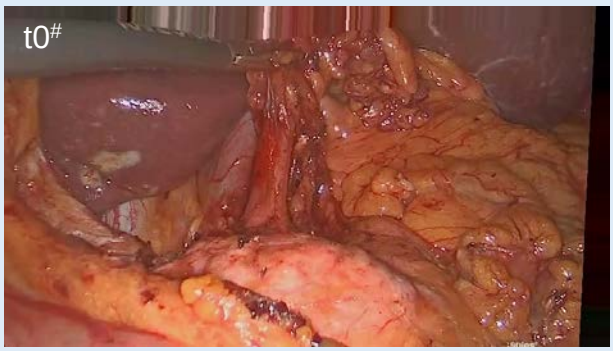
a) Perspective transformation (SH)

Least square solution H for point pairs of best matches with RANSAC



b) Multi-homography or deformation method (here MLS affine deformation)

Find affine transformation for each point with moving least squares minimization

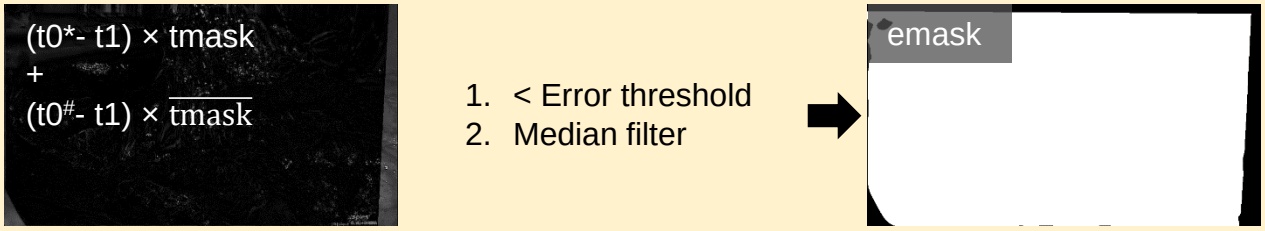


3. Overlay of HSI data on video

a) Select transformation with smallest error for each pixel

b) Add masked perspective and MLS transformation of HSI data

c) Add masked error images, threshold and median filter



d) Add masked video and HSI data