

Patient-Specific Visualization Assisted Diagnostic and Guidance (VADG) System for Gastroenterological Examination

A. Goals:

- to develop a patient-specific visualization-assisted diagnosis (VAD) and a guidance system to enable interactive examination for further probing and/or treatment;
- to automatically generate patient-specific 3D visualization of internal view GI structure and surfaces, which is compatible to existing pillcam endoscopic data collection system.

B. Brief Description:

- Human small intestine is found to be composed of a number of layers; each layer is again composed of a number of folds;
- Each image is meshed with discrete points first; next the outline of different layer is extracted;
- Each layer is triangulated and is assigned thickness;
- Finally each layer needs to be composed from back to front;
- The same technique is applied for all images.

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C. Heights of Achievements this semester:

- An exhaustive literature review on different existing techniques on construction of 3D model from 2D images has been performed;
- Finally, came out with the proposed object-based approach for 3D reconstruction ;
- At this stage, some image processing techniques are being carried out to separate different layers from each image;
- 3D reconstruction will be carried out next.

Representative figures, diagrams, videos of research

- Exhaustive analysis of topology of small intestine by comparing the images collected by pillcam with those found by consulting human anatomy books;

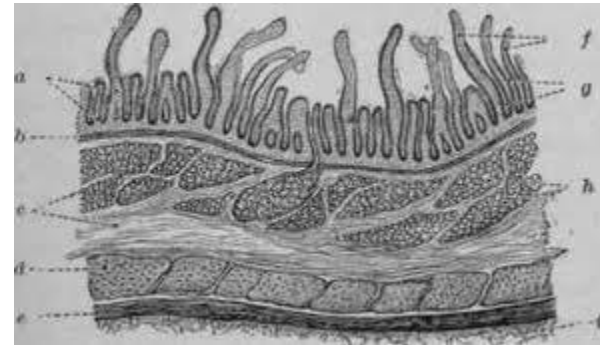


Figure 1: (Left) A single image from pillcam, (Center) transverse X-section and (Right) longitudinal X-section of small intestine.

Representative figures, diagrams, videos of research (cont'd)

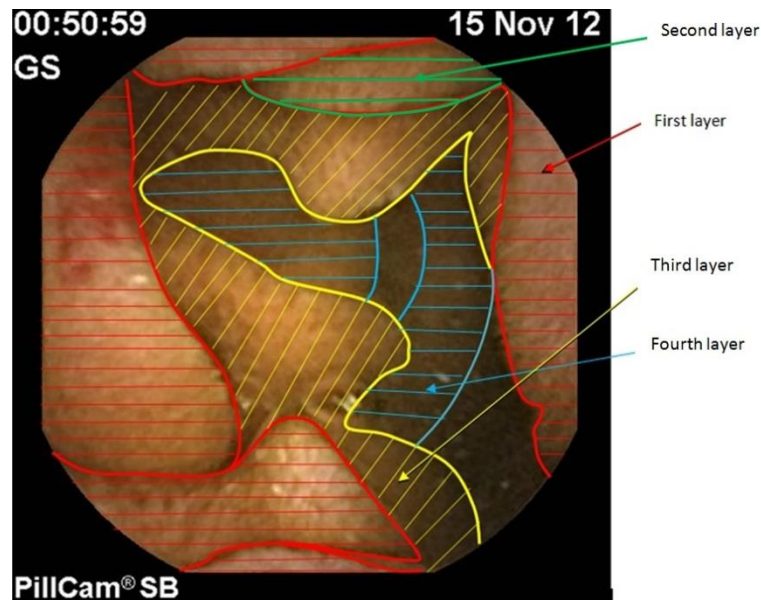


Figure 2: Separating different layers from a single image.