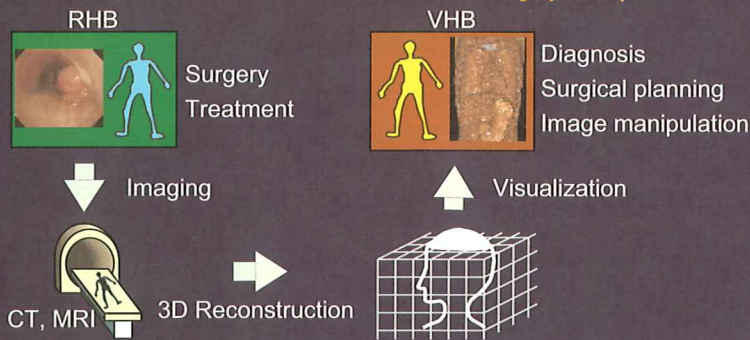


New Paradigm of Medical Image Processing - Visualization, Detection, and Navigation -

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Medical Image Processing?

From Real Human Body (RHB) to Virtualized Human Body (VHB)



Processes for VHB

- Recognition of anatomical structures such as organs, blood vessels, soft tissues
- Detection of suspicious shadows and protrusions
- Visualization
Volume rendering
- Deformation and simulation
Surgical simulation by deforming VHB

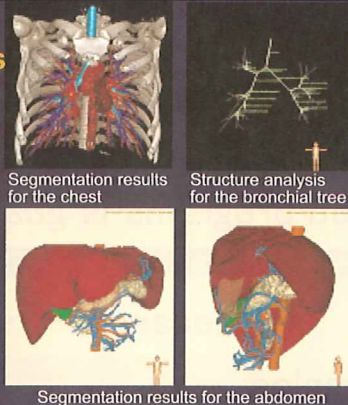
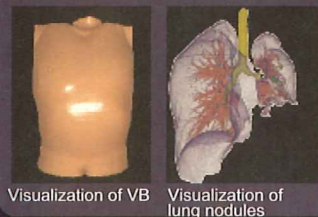
Fusion of RB and VB

- Endoscope navigation for assisting inspection and surgery

Visualization

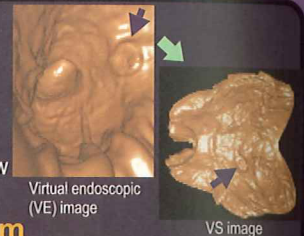
Recognition of Anatomical Structures

- Segmentation
- Structure analysis
- Visualization



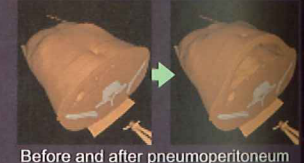
Virtual Stretching (VS)

- Incision and stretching of an organ
- Simulation of tissue deformation
- Possible to observe the entire of an inner surface of an organ only one view



Virtual Pneumoperitoneum

- Simulation of pneumoperitoneum
- Generation of virtual laparoscopic image
- Effective as a reference image for laparoscopic surgery



Detection

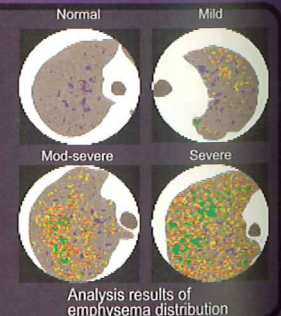
Automated Detection of Colonic Polyps

- Increase of patients due to the change of eating habits
- Automated colonic polyp detection from 3D abdominal CT images
- Use of curvature information on the colonic wall



CAD for Emphysema

- COPD including emphysema : the fifth most common disease in the world
- Necessity of computer aided diagnosis (CAD) for emphysema
- Emphysema as the low attenuation area on CT images
- Automated detection of emphysema and analysis of its three dimensional distribution



Navigation

Bronchoscope Navigation System

Navigation of the bronchoscope using organ recognition results as a body map
Visibility of organs existing beyond the bronchial wall, which are actually invisible
★ Tracking bronchoscope motion using the image registration technique between real and virtual bronchoscopic images



CAD System for Colonic Polyps

- Integrated system for observing inner surface of the colon with synchronized views of VE, VS, and MPR views
- Polyp navigation enabling us to jump to arbitrary polyp detected automatically

