

# USE OF A NOVEL TECHNIQUE FOR AUTOMATED POLYP DETECTION IN CT COLONOGRAPHY



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## Introduction:

- Computed tomography colonography (CTC) [1] also known as virtual colonoscopy (VC) is a new non-invasive colon imaging technique.
- A CTC examination is performed by indirectly examining the colon using images obtained from a computed tomography (CT) scan of a suitably prepared patient.
- Results from a major study carried out between Mar '97 and Jan '99 [2] indicate that CTC and conventional colonoscopy have similar efficiencies for the detection of significant polyps.
- We present initial results from our investigation of automated diagnosis at CTC.

## Methods:

- CTC datasets were obtained using a Siemens Somatom 4 spiral CT scanner and custom software was used to interpret the resulting DICOM compliant images.
- A volumetric representation of the scanned region was generated and subsequently segmented to isolate the colon lumen - Fig 1 (a).
- The segmented colon lumen was analysed using a standard PC workstation.
- Abnormalities were automatically identified using custom software - Fig 2 (b).
- These anomalies were classified as either potential polyps or naturally occurring features based on 2D shape analysis – Fig 2 (d).

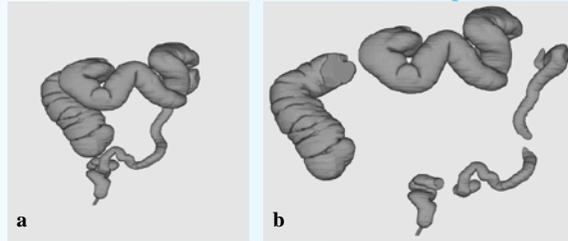


Figure 1: Segmented (a) and sub-segmented (b) renderings of the colon lumen

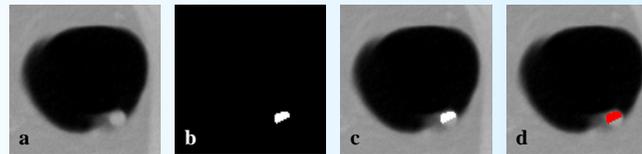


Figure 2: The polyp detection process: (a) Original axial CT slice (b) automatic anomaly identification (c) anomaly overlay (d) flagging (red = potential polyp)

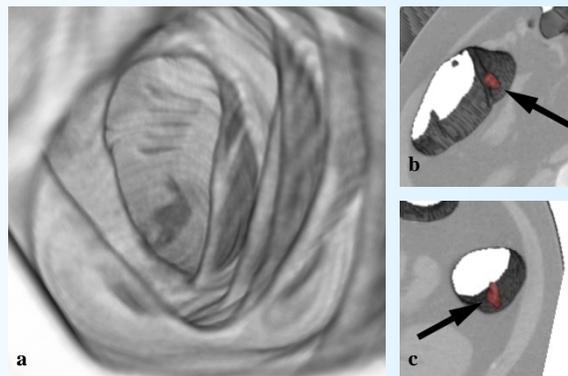


Figure 3: A high quality endoluminal rendering of the ascending colon (a) and automatically detected polyps in the ascending colon (b) and descending colon (c)

- The centreline was calculated for navigation purposes and the colon lumen was sub-segmented to facilitate automatic reporting – Fig 1 (b).

## Results:

- Five CTC datasets were used in testing.
- In each case segmentation and related high level processing was performed successfully in under 1 minute.
- The automated analysis stage detected 65% of polyps were with 34% false positive detections.
- Automated polyp detection required an average time of 13 minutes.

## Conclusions:

- Standard CTC is a slow process
- An automated analysis technique which will significantly reduce review times has been introduced
- Validation of this technique is currently underway

## References:

- Vining D.J. et al. (1994): Technical Feasibility of Colon Imaging with Helical CT and Virtual Reality. AJR 162(S) 104
- Fenlon H.M. et al. (1999): A Comparison of Virtual and Conventional Colonoscopy for the detection of colorectal polyps. NEJM 341(20) 1496-1503