

**PURPOSE:** CT colonography is an emerging technique for screening colorectal cancers. The purpose of this study was to develop a computer-aided diagnosis scheme that detects clinically important polyps (>5 mm) in CT colonography, and to assess its accuracy compared to the gold standard of conventional colonoscopy.

**METHOD AND MATERIALS:** CT colonography was performed for patients with prepared colons by use of a standard technique, air distension, and helical scanning (2.5-5 mm collimation, 1-2 pitch, 1.5-2.5 mm reconstructed interval, and 60-100 mA tube current). Transverse CT images were interpolated along the axial direction to yield an isotropic volume data set. The colon was segmented automatically using a knowledge-guided colon segmentation technique. Polyp candidates were detected with a novel feature-guided segmentation technique based on a geometric feature (shape index) and two texture features (gradient concentration and variance of CT values) that were computed on the segmented colon. A quadratic discriminant analysis was performed in the feature space to reduce false positives, and the final detected polyps were obtained. The locations of the detected polyps were then compared to those identified by colonoscopy.

**RESULTS:** Seventy-one cases were analyzed, including 14 cases with a total of 21 polyps as determined by colonoscopy. Seventeen of the polyps were 5-10 mm, three were 11-12 mm, and one was 25 mm in diameter. Application of our method detected 95% (20 out of 21) of the polyps, with a false-positive rate of 2.0 detections per patient. The false negative was one of the two polyps in a patient. Consequently, in a by-patient analysis, our method yielded 100% sensitivity with the same false-positive rate. The types of false positives were similar to those due to common perceptual errors for radiologists. However, most of these false positives were easily distinguishable from polyps by experienced radiologists.

**CONCLUSIONS:** The computerized scheme has the potential to depict polyps in CT colonography with high sensitivity and an acceptable false-positive rate. It is potentially useful for reducing the interpretation time and for improving the diagnostic performance of radiologists in the detection of polyps in CT colonography.

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