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Automated Polyp Detection Systems

Colorectal cancer is the second leading cause of cancer death in the United States and fourth worldwide. Colorectal cancer often develops from precancerous polyps which, when found early, may be easily and safely removed. Colorectal polyps are often asymptomatic and are typically detected through routine optical colonoscopy (OC) screening. While there have been many advancements in polyp detection and OC, roughly 22% of polyps still go undetected during an OC screen and 4-6% of diagnosed colorectal cancers are thought to have been missed on prior colonoscopies. Because the incidence and mortality of colorectal cancer decreases with early detection, it is important to reduce the rates of undetected polyps.

Researchers at Arizona State University in collaboration with Dr. Gurudu of the Mayo Clinic have developed several novel systems for computer-aided detection of polyps in optical colonoscopy images. The systems use a variety of tools to enable better and more sensitive polyp detection including learning existing features, evaluating polyp edges/boundaries to automatically monitor video quality, voting and classification schemes, neural networks, etc. Experimental results based on the PI’s collection of videos shows remarkable performance improvements with each system over current methods, with significant sensitivity and dramatically fewer false positives.

These technologies alone or together offer new and effective means to detect the boundaries of colon polyps in optical colonoscopy and subsequently reduce the polyp miss rates during routine screening.

Potential Applications

- Automatic detection of polyps in colonoscopy images

Benefits and Advantages

- Sensitivity of 88.0% for the CVC-ColonDB database
- False positives per frame of 0.05
- Does not depend on global shape or texture to detect polyps
- Doesn't require perfect identification of whole polyp boundaries

- Can detect a large variation of polyp sizes and shapes
- Polyp detection latency of 0.3 seconds
- Utilizes all the available image features rather than a single subset of polyp properties

For more information about the inventor(s) and their research, please see Dr. Liang's laboratory webpage