U-NET ARCHITECTURE FOR THE DETECTION AND CLASSIFICATION OF POLYP IN MEDICAL IMAGES

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The analysis of colonoscopy images is highly advantageous in the early detection of colorectal cancer. Automated tissue segmentation is a crucial tool for enhancing the accuracy and robustness of lesion identification and classification, which are among the most relevant clinical target applications. The application of computer vision and machine learning methodologies has facilitated the automation of video colonoscopy analysis, leading to enhanced objectivity and improved polyp detectability in segmentation. The present investigation delineates a technique for polyp segmentation that was devised for the polyp segmentation challenges of the Endoscopic vision central venous catheter-- clinic database (CVC-ClinicDB). The method is founded on a U-shaped encoder-decoder network (U-Net) and incorporates a support vector machine – radial basic function (SVM-RBF) classifier. The primary contribution of the paper involves an extensive evaluation of the proposed architecture. This evaluation is conducted by subjecting the architecture to established image segmentation benchmarks and employing diverse metrics. Additionally, cross-validation is performed on the CVC-ClinicDB training dataset. The article provides a comprehensive account of multiple research that were conducted to investigate network configurations, design parameter values, data augmentation techniques, and polyp characteristics. The results indicate the significance of employing data augmentation techniques and the meticulous consideration given to the selection of the method's design parameters. The proposed methodology yields state-of-the-art results while operating at near real-time speeds.

Keywords—Polyp Segmentation, U-Shaped Encoder-Decoder Network (U-Net), Support Vector Machine (SVM), Data Augmentation

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