

Diagnostic of Bladder Cancer Using Hybrid Neural Networks Based on Edge Detectors

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Abstract

Bladder cancer is one of the most common malignant diseases of the urinary tract and is the fourth most common malignant disease in men in Croatia [1]. The diagnostic procedure for bladder cancer usually consists of a biopsy and pathohistological findings. Such an approach can often be invasive and time consuming [2]. For this reason, an endomicroscopic method based on confocal laser endomicroscopy (CLE) supported by artificial intelligence algorithms is being introduced into clinical practice. The application of artificial intelligence in problems of medical image recognition is most often based on the application of artificial neural networks (ANN), most often convolutional neural networks (CNN). The selection of CNN models may require considerable computing resources, which are often unavailable in clinical practice. For this reason, edge detectors-based neural network hybrid models are being introduced. Such approaches offer a stable classification performance with much simpler neural network architectures [3]. In this paper, a multi-class classification approach that is based on four classes (high-grade carcinoma, low-grade carcinoma, carcinoma in situ and healthy mucosa) is presented. From obtained results it can be noticed that such an approach offers stable classification performances for multi-class classification as well, achieving macro AUC of 0.98 and micro AUC of 0.97

Keywords

Artificial Neural Network, AUC, Bladder Cancer Diagnosis, Edge detector, Hybrid model

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