

Refined Edge Detection Network

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Abstract : Edge detection is represented as one of the most challenging tasks in computer vision, due to the complexity of detecting the edges or boundaries in real-world images that contains objects of different types and scales like trees, building as well as various backgrounds. Edge detection is represented also as a key task for many computer vision applications. Using a set of backbones as well as attention modules, deep-learning-based methods improved the detection of edges compared with the traditional methods like Sobel and Canny. However, images of complex scenes still represent a challenge for these methods. Also, the detected edges using the existing approaches suffer from non-refined results while the image output contains many erroneous edges. To overcome this, in this paper, by using the mechanism of residual learning, a refined edge detection network is proposed (RED-Net). By maintaining the high resolution of edges during the training process, and conserving the resolution of the edge image during the network stage, we make the pooling outputs at each stage connected with the output of the previous layer. Also, after each layer, we use an affined batch normalization layer as an erosion operation for the homogeneous region in the image. The proposed methods are evaluated using the most challenging datasets including BSDS500, NYUD, and Multicue. The obtained results outperform the designed edge detection networks in terms of performance metrics and quality of output images.

Keywords : edge detection, convolutional neural networks, deep learning, scale-representation, backbone

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