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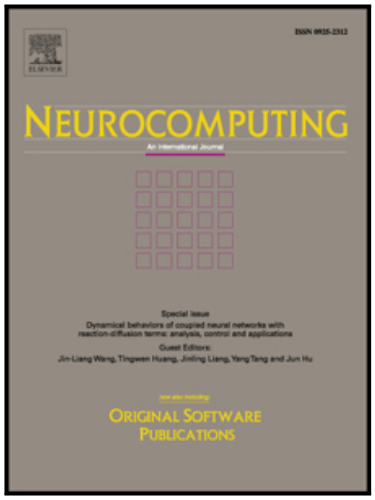

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Learning Hybrid Convolutional Features for Edge Detection

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Abstract

We present a novel convolutional neural network (CNN) based pipeline which can effectively fuse multi-level information extracted from different intermediate layers generating hybrid convolutional features (HCF) for edge detection. Different from previous methods, the proposed method fuses multi-level information in a feature-map based manner. The produced hybrid convolutional features can be used to perform high-quality edge detection. The edge detector is also computationally efficient, because it detects edges in an image-to-image way without any post-processing. We evaluate the proposed method on three widely used datasets for edge detection including BSDS500, NYUD and Multicue, and also test the method on Pascal VOC'12 dataset for object contour detection. The results show that HCF achieves an improvement in performance over the state-of-the-art methods on all four datasets. On BSDS500 dataset, the efficient version of the proposed approach achieves ODS F-score of **0.804** with a speed of **22 fps** and the high-accuracy version achieves ODS F-score of **0.814** with **11 fps**.

Keywords: Edge detection; Hybrid convolutional features; Feature integration; High accuracy; Human performance

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