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Improved Segmentation and Extrapolation for Block-Based Shape-Adaptive Image Coding

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Abstract

In this work, we address the issues of image segmentation and boundary block padding involved in shape-adaptive image coding. Image segmentation helps to exploit human visual system (HVS) characteristics for bit-rate reduction in coding an image. In the context of block-based shape-adaptive coding, segmentation allows the use of more effective boundary block coding techniques than conventional methods. Segmentation algorithms considered are based on mathematical morphology tools. Following a brief discussion of the drawbacks of two reference segmentation algorithms, an improved *edge detection, local-activity classification* segmentation algorithm is proposed. Simulation results indicate that the proposed algorithm enjoys the advantages of subjectively accurate contour location, simple image partition and lower computational load. In order to code boundary blocks efficiently, an optimal block padding approach, which minimizes the l_1 norm of the corresponding transform coefficients, is proposed. The proposed scheme draws on a basis pursuit problem, which uses linear programming for its solution. It is shown that the proposed scheme provides better coding results (in terms of bit-rate reduction) than various other block-based shape-adaptive coding techniques.