Segmentation-Based Shape-Adaptive Image Coding

Segmentation-based shape-adaptive image coding systems aim to provide higher reconstructed image quality, compared with conventional image coding systems such as **JPEG**. The whole system contains image segmentation, texture coding (shape-adaptive coding), and contour coding. Our work is focused on the first two topics.

First, in image segmentation, after a brief gray-scale morphology overview, we present two popular morphological image segmentation systems. Our implementation indicates that available techniques need to be improved for coding applications. Therefore, a new segmentation algorithm, **edge detection, local-activity classification segmentation algorithm,** is proposed. The experiments show that the proposed algorithm enjoys the advantage of proper segmentation output for coding applications at a moderate computation load.

Next, we present several shape-adaptive coding techniques in two separate categories, block-based shape-adaptive coding and region-based shape-adaptive coding. Existing algorithms such as **SADCT** and **LPE** padding fall into the first category. Inspired by the block data extrapolation idea, we propose an optimal approach (in a minimum norm sense) to data extrapolation. The proposed scheme attempts to minimize the sum of the absolute values of the DCT transform coefficients, and the advantages achieved are further discussed in the talk. The simulation results show that our proposed algorithm improves reconstructed image quality in some applications. Region-based coding algorithms are introduced as well and their drawbacks are discussed at the end of this talk.

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