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Comparative Performance Evaluation of Some Fuzzy and Classical Edge Operators

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Abstract: A simple fuzzy complement edge operator has been developed based on the Yager involutive fuzzy complements.

Key words: Edge operator has been developed

INTRODUTION

The proposed edge operator referred to as the Yager involutive fuzzy complement (YIFC) edge operator has been compared with two fuzzy edge operators, the competitive fuzzy edge detector (CFED) [1] and the edge operator based on fuzzy if-then rules (FITR) [2] and three classical edge operators – Sobel, Laplacian and Prewitt on the basis of the results of the well-known Canny edge operator [3]. The CFED detects the edge pixels first, then competitive rules are applied for thinning the ridges and finally single and double pixel noise specks are removed. The fuzzy classifier differentiates pixels into four edge classes, a background class and a speckle edge class (noisy edge class). Sixteen fuzzy if-then rules are proposed for the FITR based edge operator. A bell-shaped function is chosen for the membership function of the fuzzy set. Combining all the FITR generates a set of potential edge pixels. Edge point for each pixel is assigned by the membership function. All the edge operators have been tested with test images of 8 bits/pixel and size 256x256. The experimental results have shown that the YIFC edge operator is capable to outperform the CFED, the FITR based edge operator and the classical edge operators in detecting the edge pixels in an input image and providing better visual quality edge image. Also it has been observed that a variety of clear and sharp edge images with different thickness can be obtained by the YIFC edge operator. Our future work involves the use of the proposed edge operator in image compression by utilizing the basic concept of block truncation coding. The research is currently underway and the research paper is expected to come out in the near future.

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