

A Novel Fuzzy Color Median Filter Based on a Cascade of Fuzzy Inference Systems

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Abstract

Median filters are widely used for the reduction of impulse noise in digital images. Since particular problems appear for color images affected by color impulse noise (as color altering or imperfect noise elimination), many color median filtering methods are still developed. Among these, fuzzy median filters are reported to be highly efficient. In this paper, we propose a novel fuzzy logic-based color filtering algorithm, designed for the HSV color space, in the form of a cascade of three fuzzy logic systems, working each on a separate color component. The proposed strategy can be seen as a generalization and extension of the crisp conditional ordering in the HSV color space. Due to the cascade configuration and to the use of fuzzy ordering relations, the performance of the proposed filter on color noise filtering is superior to the crisp approach and to other fuzzy approaches, as shown by the experimental results.