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Fuzzy Averaging Filter For Impulse Noise Reduction In Colour Images With A Correction Step

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Abstract

In this paper we propose a fuzzy detection and reduction method for impulse noise in colour images. Detection is based on the fuzzyfication of a well-known statistic called ROD. The noise degrees obtained are used to reduce impulses by employing a fuzzy averaging between the input colour vector and a robust estimate of noise-free colour vector within the input neighbourhood. Fuzzy averaging has some advantages in terms of both noise reduction and detail preservation in front of detect and replace approaches because of threshold based decisions of the latter. However, robustness of the former is lower. We solve this problem by including a correction mechanism that checks the fuzzy noise degree of the output and replaces it with a robust colour vector either when noise has not been properly reduced or when a colour artefact has been introduced. We carry out a thorough study of the method parameter setting and give a convenient and robust setting. Experimental results show that our approach is very robust in front of four different types of impulse noise.

Keywords: Color Image Filter, Correction Step, Fuzzy Filter, Impulse Noise

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