

RANDOM-VALUED IMPULSE NOISE DETECTION CONSIDERING COLOR DISTANCE AND CORRELATION AMONG RGB COMPONENTS

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ABSTRACT. *In order to realize a superior switching median filter for an image corrupted by the random-valued impulse noise, we propose a new detection method with noise enhancement. The present method consists of the noise enhancement and the noise detection processes. In the enhancement process, the color distance on CIELAB color space is considered to detect the noise-corrupted pixel with small amplitude noise, and reflected to the pixel value in RGB color space. The detection process employs the correlation information among RGB components, because R, G and B components of the color image correlate strongly each other in general. Moreover, the variance of the signal is also used especially for the detection on the flat part. Through the experimental results, the quantitative and the qualitative superiorities of the present method are verified.*

Keywords: Impulse noise removal, Switching median filter, Impulse noise detection

1. Introduction. Digital images are very important information in many research and application fields. In the image sensing and/or transmission processes, the digital images are often corrupted by the impulse noise. It is, thus, significant to remove the noise in the image before subsequent processing. In order to realize a fine restoration of image corrupted by the impulse noise, various nonlinear filters based on the median filter have been studied so far [1-5].

In recent years, switch type filters, which restore only noise-corrupted pixels, are frequently employed [6-8]. The typical switch type filters include a noise detection process, and thus need an effective noise detector, because their restoration performances depend on the noise detection ability.

For the detection of the salt-and-pepper impulse noises in the gray scale image, the various methods have been proposed so far [9, 10]. Moreover, it has been reported that these methods are also expanded to a color image by applying them to R, G and B components independently. However, the most conventional detection methods mentioned above can treat only the salt-and-pepper impulse noises. These methods are also not useful for the random-valued impulse noises, because it is difficult to detect the noise similar to the pixel value.

In this paper, we propose a new random-valued impulse noise detection method considering CIELAB and RGB color spaces. The proposed method includes the noise enhancement and the noise detection processes.