

Universal Impulse Noise Suppression Using Extended Efficient Nonparametric Switching Median Filter

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Abstract.

This paper presents a filtering algorithm called extended efficient nonparametric switching median (EENPSM) filter. The proposed filter is composed of a nonparametric easy to implement impulse noise detector and a recursive pixel restoration technique. Initially, the impulse detector classifies any possible impulsive noise pixels. Subsequently, the filtering phase replaces the detected noise pixels. In addition, the filtering phase employs fuzzy reasoning to deal with uncertainties present in local information. Contrary to the existing conventional filters that only focus on a particular impulse noise model, the EENPSM filter is capable of filtering all kinds of impulse noise (i.e. the random-valued and/or fixed-valued impulse noise models). Extensive qualitative and quantitative evaluations have shown that the EENPSM method performs better than some of the existing methods by giving better filtering performance.

Keywords: *Image processing, impulse noise, digital image, noise filtering, nonparametric switching median filter.*