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## Video oriented filter for impulse noise reduction

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### Abstract

A window-adaptive video filter for removal of impulse noise from grayscale videos is proposed. The new method is based on local orientation estimation. The dominant orientation of the pattern in a local spatial neighborhood is computed by minimizing an expression of directional derivatives, and at the same time the orientation strength is also computed. Based on the local spatial orientation and its strength, the size, shape, and orientation of 3D filter window are adaptively determined, which leads to the proposed window-adaptive 3D median filter. To further enhance denoising performance, a new noise detection mechanism is developed and integrated to the proposed video filter. By using this noise detector, video pixels are classified into noise-free and noisy ones. For the noisy pixels detected, the proposed window-adaptive 3D filter is performed. Experimental results show that the proposed method outperforms other state-of-the-art video denoising methods in both objective measure and visual evaluation.

*Keywords:* Video denoising; Window-adaptive filter; Orientation estimation; Impulse noise.

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