QUADRATIC WEIGHTED MEDIAN FILTERS FOR NOISY IMAGE SHARPENING (TueAmOR2)

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Abstract :

Quadratic Volterra filters are shown to be very effective in image sharpening applications. The linear combination of polynomial terms, however, yields poor performance in noisy environments. Weighted median filters, in contrast, are well−−known for their outlier suppression and detail preservation properties. The weighted median sample selection methodology is naturally extended to the polynomial sample case, yielding a filter structure referred to as quadratic weighted median (QWM), that exploits the higher order statistics of the observed samples while simultaneously being robust to outliers arising in the higher order statistics of environment noise. The robustness of QWM filter to higher order statistics of noise is analyzed through the determination of breakdown probability. The simulation results show that the proposed method can successfully suppress the noise and enhance the image details simultaneously. Compared with the finite−−impulse response (FIR) Quadratic Volterra sharpener, the QWM filter exhibits superior performance.

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