M.S., Thesis

Digital Image Restoration using Combined Filter

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Abstract

We proposed the combined filtering method considering the noise visibility function to restore degraded digital image with additive white Gaussian noise.

The conventional method by Mean, Median and Nagao filtering smoothed additive noise with dynamic edge area blurred results.

We classified the degraded image into 3 kinds of area by variance values whose thresholds differing according to its SNR.

The combined filters which we proposed have three component filters, the first one is the Mean filter that cleans up low variance valued area and the second one is the line filter which processes in 4 directional lines.

We compute the variance of 4 directions in the 5×5 window, and then

select the direction which has the smallest variance value and compute the average of the 5 pixels in that selected line. The computed value substitutes the center pixel in the 5×5 window.

The high variance area of degraded image was not processed in order to preserve dynamic range according to the noise visibility function. This is called the 3rd component of the filter.

Through the experimental results, we showed that proposed method had better results compared with those by a conventional method which are Mean, Median and Nagao filtering methods, our filter showed very short process time too.

Proposed method, based on the human visibility function, showed better results not only in a MSE but also in the visual appearances as well.