

Digital Image Processing

Exercise 02

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Part I : Theory

1.&2.

median filter be applied to an image: removes shot noise

The median is calculated by first sorting all the pixel values from the window into numerical order, and then replacing the pixel being considered with the middle (median) pixel value. So it is good to process the image with shot noise.

moving average filter be applied to an image: the image processing should be very fast or we have only limited resources

The average filter works by moving through the image pixel by pixel, replacing each value with the average value of neighbouring pixels, including itself. So it is good to reduce the amount of intensity variation between neighbouring pixels.

3. No

4. The moving average filter is a convolution using a very simple filter kernel, so it is the fastest digital filter available. It is optimal for a common problem, reducing random white noise (good), but also reduces the sharpness of the edges (bad).

Since the noise we are trying to reduce is often random noise, none of the input points is special, each is just as noisy as its neighbor. Therefore, it is useless to give preferential treatment to any one of the input points by assigning it a larger coefficient in the filter kernel. The lowest noise is

obtained when all the input samples are treated equally, i.e. the moving average produces the lowest noise for a given edge sharpness and no filter is better than the simple moving average.