

Image Restoration & Reconstruction

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Spatial Filtering: Mean Filters (1)

Let S_{xy} represent the set of coordinates in a rectangle subimage window of size $m \times n$, centered at (x, y) .

Arithmetic mean filter

$$f(x, y) = \frac{1}{mn} \sum_{(s, t) \in S_{xy}} g(s, t)$$

Spatial Filtering: Order-Statistic Filters (1)

Median filter

$$f(x, y) = \underset{(s, t) \in S_{xy}}{\text{median}} \{g(s, t)\}$$

Spatial Filtering: Order-Statistic Filters (1)

Max filter

$$f(x, y) = \max_{(s, t) \in S_{xy}} \{g(s, t)\}$$

Spatial Filtering: Order-Statistic Filters (1)

Min filter

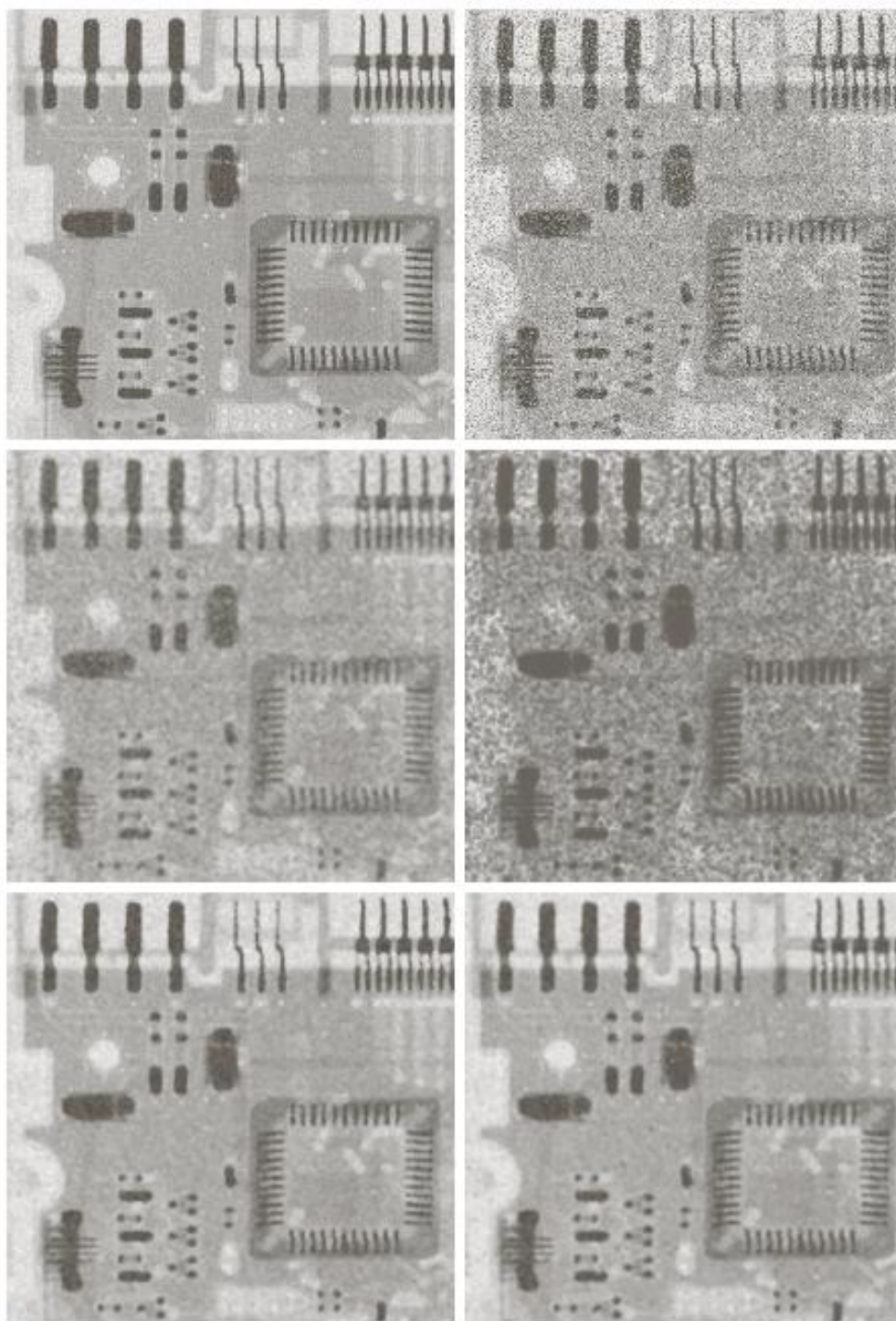
$$f(x, y) = \min_{(s, t) \in S_{xy}} \{g(s, t)\}$$

Spatial Filtering: Order-Statistic Filters (3)

Alpha-trimmed mean filter

$$f(x, y) = \frac{1}{mn - d} \sum_{(s, t) \in S_{xy}} \{g_r(s, t)\}$$

We delete the $d / 2$ lowest and the $d / 2$ highest intensity values of $g(s, t)$ in the neighborhood S_{xy} . Let $g_r(s, t)$ represent the remaining $mn - d$ pixels.



a	b
c	d
e	f

FIGURE 5.12

(a) Image corrupted by additive uniform noise.

(b) Image additionally corrupted by additive salt-and-pepper noise. Image (b) filtered with a 5×5 ; (c) arithmetic mean filter; (d) geometric mean filter; (e) median filter; and (f) alpha-trimmed mean filter with $d = 5$.