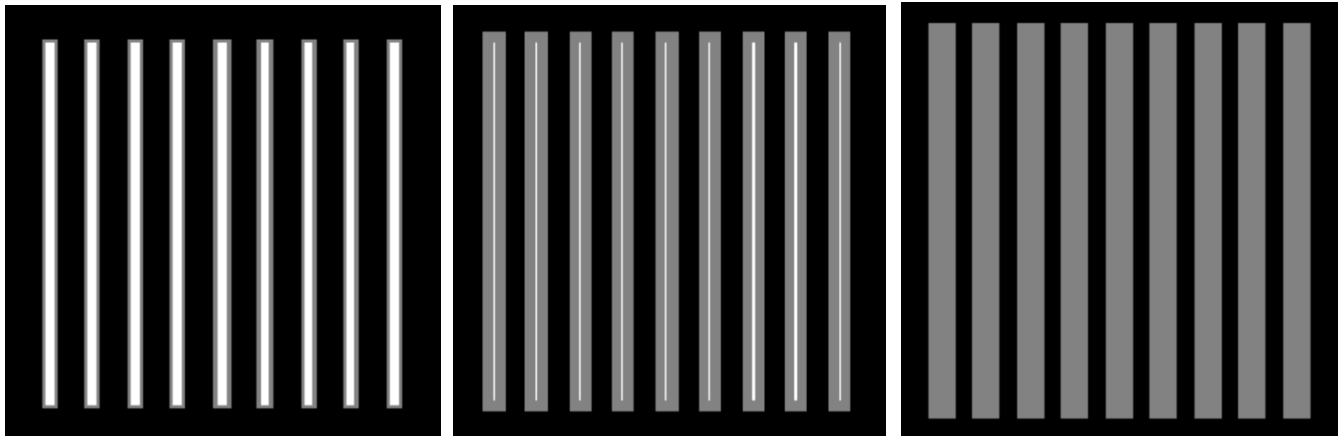


5.9: Midpoint filter



(a). 3*3 Midpoint Filter (b). 7*7 Midpoint Filter (c). 9*9 Midpoint Filter

5.10:

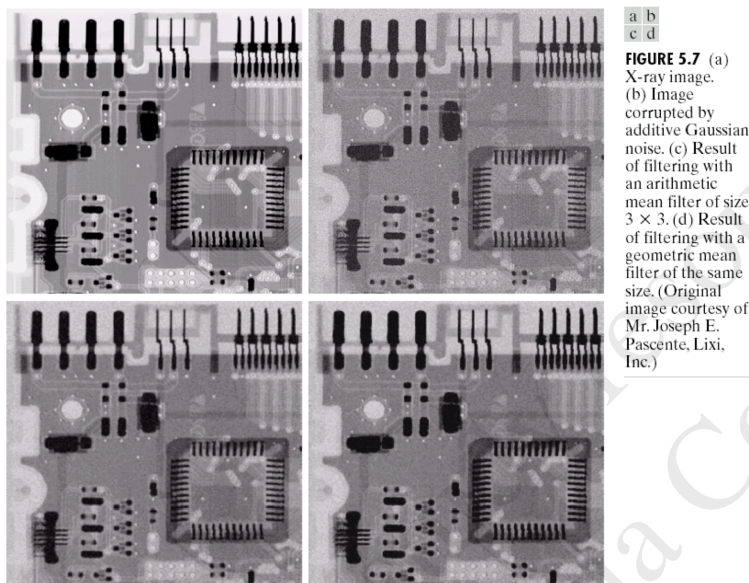


FIGURE 5.7 (a) X-ray image. (b) Image corrupted by additive Gaussian noise. (c) Result of filtering with an arithmetic mean filter of size 3×3 . (d) Result of filtering with a geometric mean filter of the same size. (Original image courtesy of Mr. Joseph E. Pascente, Lixi, Inc.)

(a): The geometric mean is 0 whenever any pixels in the filter window is 0. If the edge has values 0 and 1, then the geometric mean will only have values 0 and 1, but the arithmetic mean will give intermediate values, and it will cause blur.

If we use step edge for an example:

Original image:	0	0	0	30	30	30	0	0	0
Arithmetic mean filter:	0	10	20	30	20	10	0		
Geometric mean filter:	0	0	0	46	0	0	0		

(b): Black has value of 0, so after using geometric mean filter, the filter window that contains at least one 0 value pixel will still be 0. Since the mask window of several different center pixel can contains the same black pixel, so the original black area will be spread, therefore thickened.