

## R07922106 曾俊為 CV\_HW8

### 1. Gaussian noise, amplitude=10



Gaussian noise, amplitude=10, SNR = 13.604



Box\_3x3, SNR = 11.473



Box\_5x5, SNR = 8.525



Median\_3x3, SNR = 11.419



Median\_5x5, SNR = 8.721



Opening-then-closing, SNR = 13.267



Closing-then-opening, SNR = 13.543

2. Gaussian noise, amplitude=30



Gaussian noise, amplitude=30, SNR = 4.059



Box\_3x3, SNR = 9.597



Box\_5x5, SNR = 8.126



Median\_3x3, SNR = 8.785



Median\_5x5, SNR = 7.961



Opening-then-closing, SNR = 11.132



Closing-then-opening, SNR = 11.251



### 3.Salt-and-pepper noise, probability=0.1



Salt-and-pepper noise, probability=0.1, SNR = -2.107



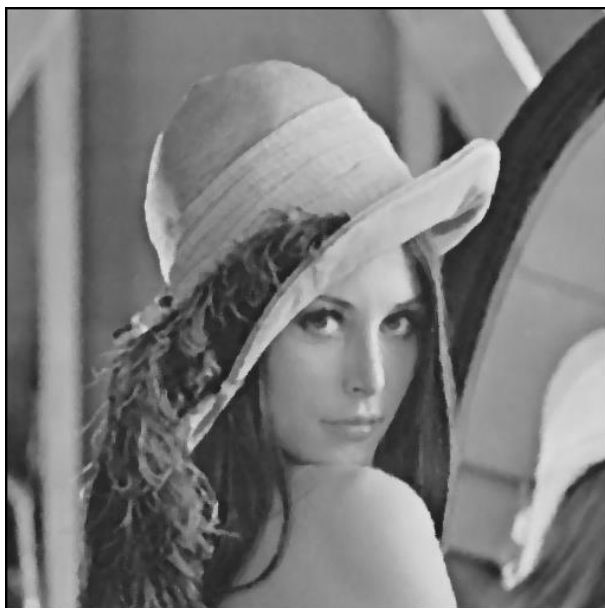
Box\_3x3, SNR = 5.452



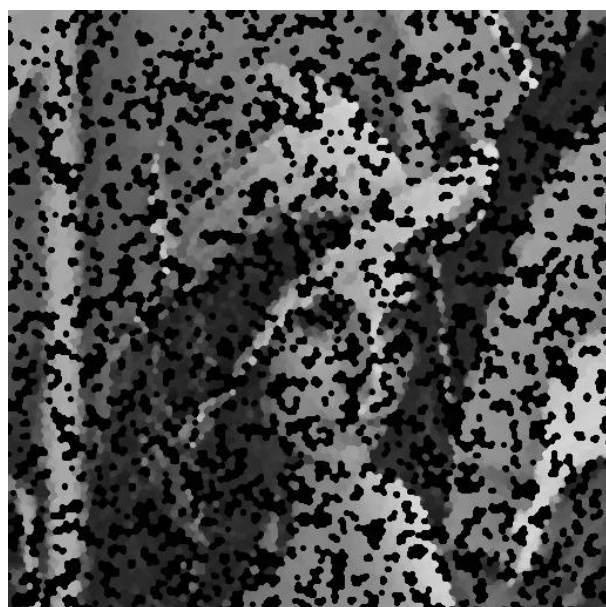
Box\_5x5, SNR = 6.065



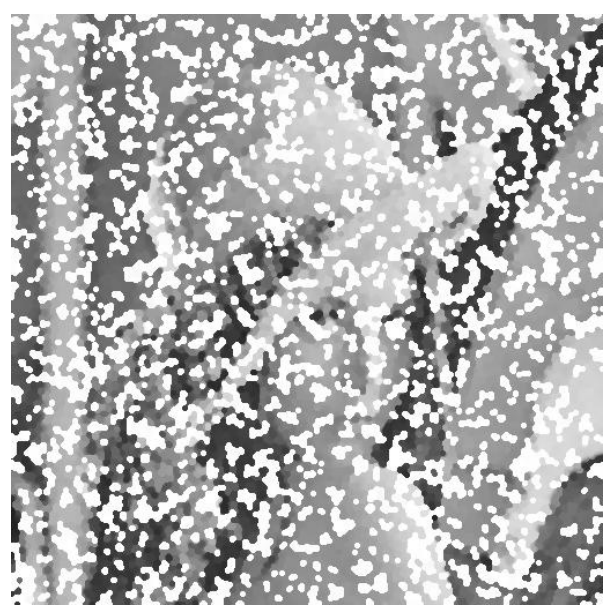
Median\_3x3, SNR = 10.669



Median\_5x5, SNR = 8.685



Opening-then-closing, SNR = -2.035



Closing-then-opening, SNR = -2.407

4.Salt-and-pepper noise, probability=0.05



Salt-and-pepper noise, probability=0.05, SNR = 0.896



Box\_3x3, SNR = 7.731



Box\_5x5, SNR = 7.310



Median\_3x3, SNR = 11.750



Median\_5x5, SNR = 8.788



Opening-then-closing, SNR = 5.696



Closing-then-opening, SNR = 5.55

從以上 noise removal 的結果可以看出，5\*5 box filter 的降噪效果比起 3\*3 box filter 並沒有太大的提升，反而都會讓影像變得模糊。而 median filter 在處理 salt-and-pepper noise 上的效果相當好，5\*5 median filter 降噪的效果也比 3\*3 好上許多，不過同樣的是影像會變得模糊，所以可能就要依據需求有所取捨了。而 opening-then-closing 的方法在處理 salt-and-pepper noise 時，結果會變得很奇怪，有一顆顆大黑點在影像上；反之 closing-then-opening 則是會出現一顆顆大白點在影像上，同樣也是讓人失望的降噪處理結果。