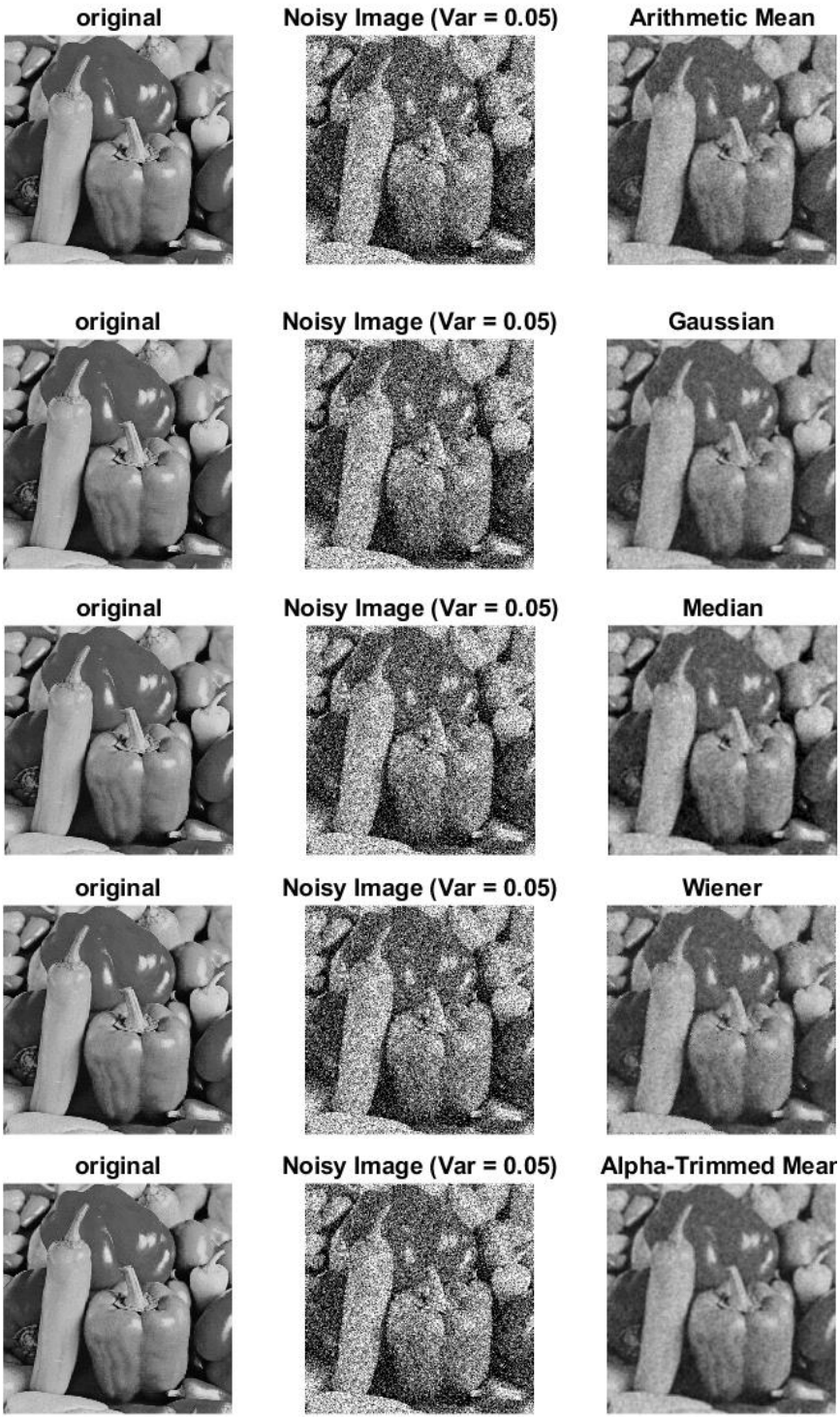
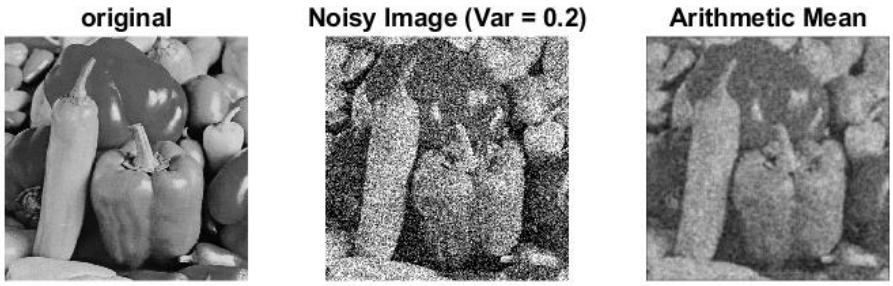
CA3 report b10505057

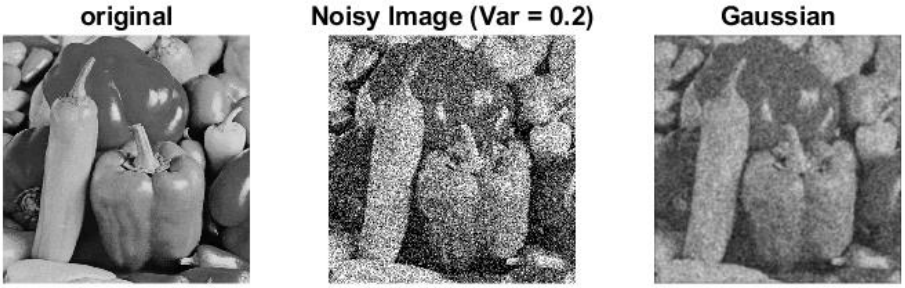
Problem2

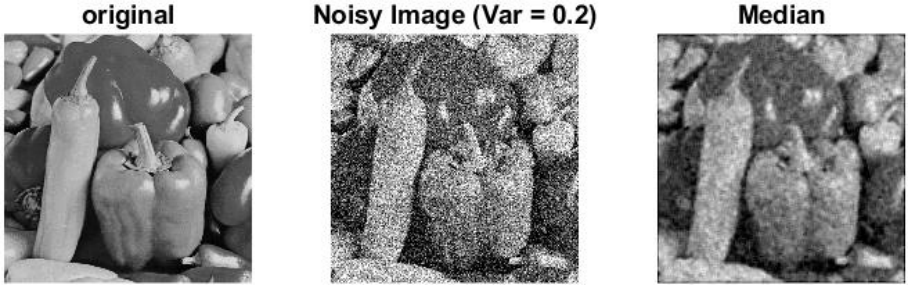


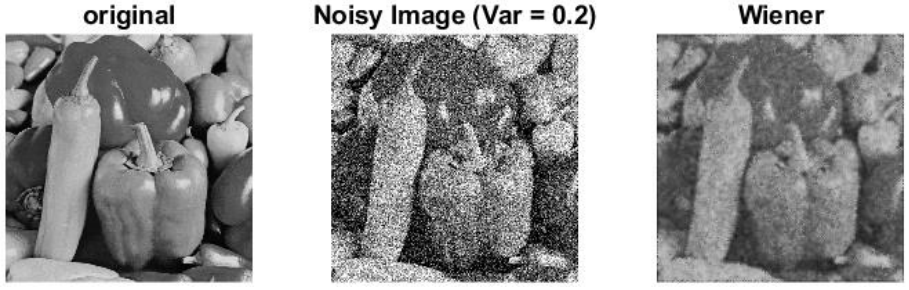
Name	Value
AMkernel	5
AMpsnr	24.2275
AMresult	512x512 uin...
ATalpha	0.1000
ATkernel	7
ATpsnr	25.0896
ATresult	512x512 uin...
Gkernel	9
Gpsnr	24.7868
Gresult	512x512 uin...
Gsigma	1.7400
img	512x512 uin...
Mkernel	7
Mpsnr	24.2421
Mresult	512x512 uin...
noisy_img_1	512x512 uin...
noisy_img_2	512x512 uin...
Wkernel	7
Wpsnr	24.3508
Wresult	512x512 uin...

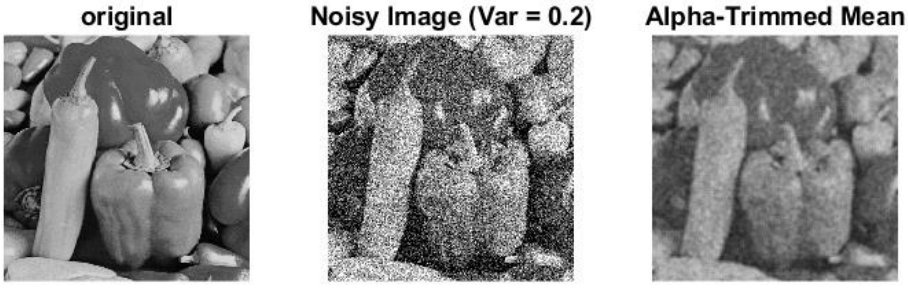
Var=0.05	Arithmetic mean	Gaussian	Median	Wiener	Alpha-trimmed
best kernel	5	9	7	7	7
Best PSNR	24.23	24.79	24.24	24.35	25.09
best param		$\sigma = 1.74$			$\alpha = 0.1$







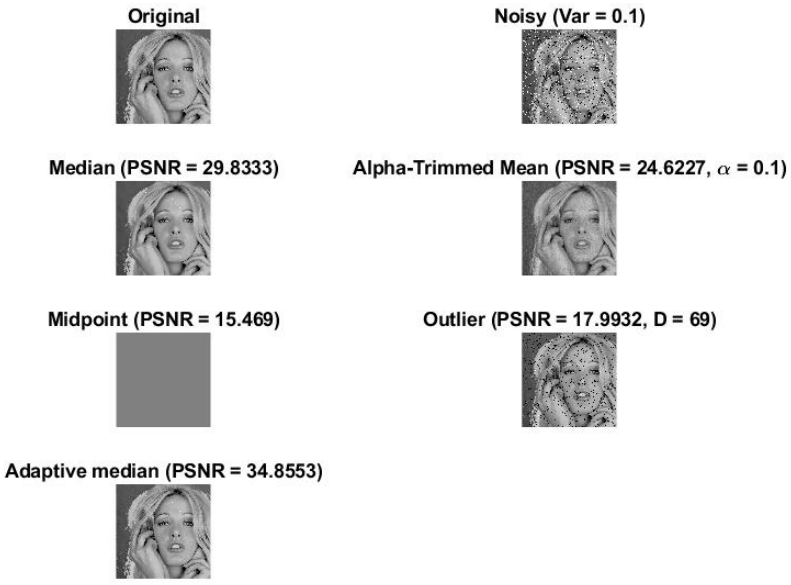


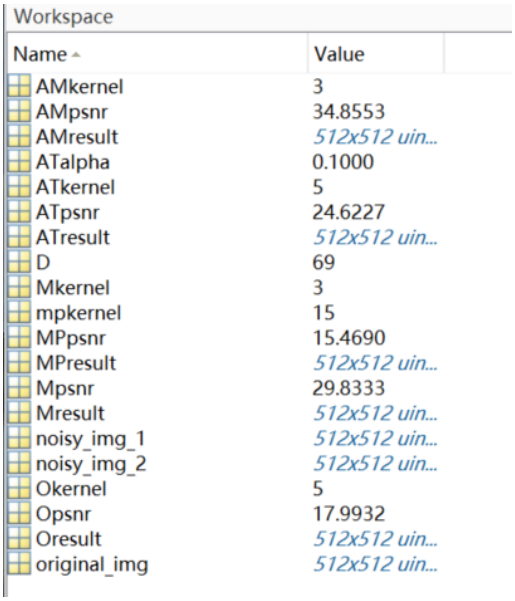


Name	Value
AMkernel	7
AMpsnr	20.3411
AMresult	512x512 uin...
ATalpha	0.1000
ATkernel	9
ATpsnr	20.7953
ATresult	512x512 uin...
Gkernel	13
Gpsnr	20.5384
Gresult	512x512 uin...
Gsigma	2
img	512x512 uin...
Mkernel	9
Mpsnr	20.5365
Mresult	512x512 uin...
noisy_img_1	512x512 uin...
noisy_img_2	512x512 uin...
Wkernel	9
Wpsnr	20.2029
Wresult	512x512 uin...

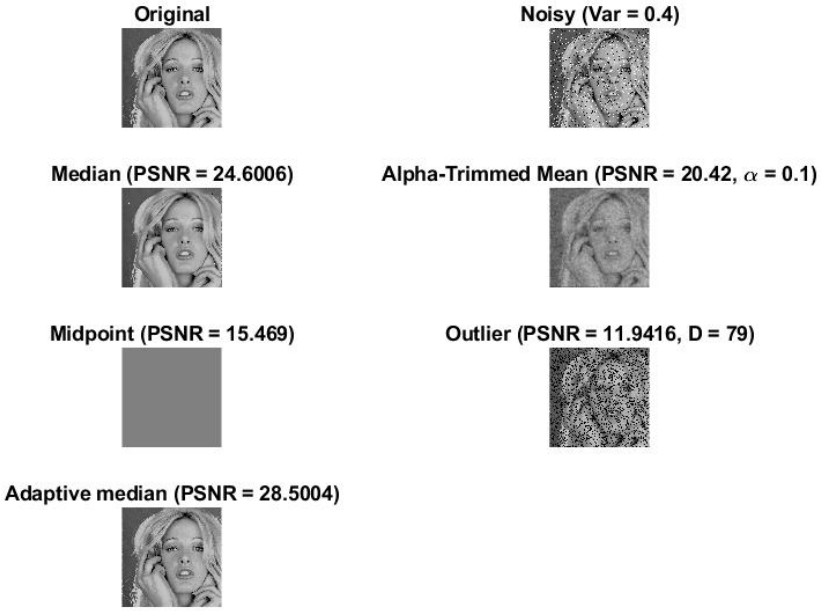
Var=0.05	Arithmetic mean	Gaussian	Median	Wiener	Alpha-trimmed
best kernel	7	13	9	9	9
Best PSNR	20.34	20.54	20.54	20.20	20.80
best param		$\sigma = 2$			$\alpha = 0.1$

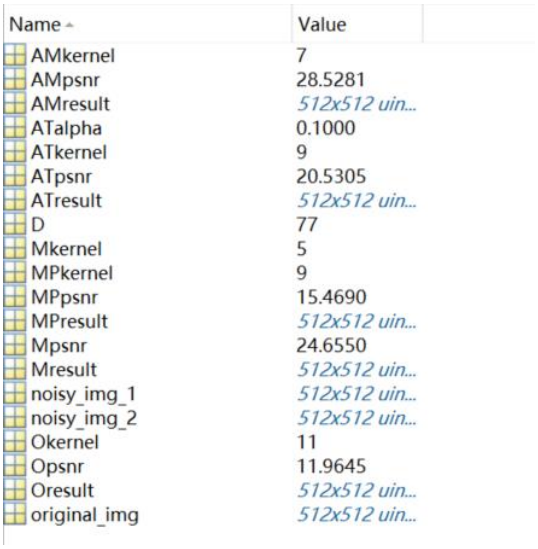
Problem3





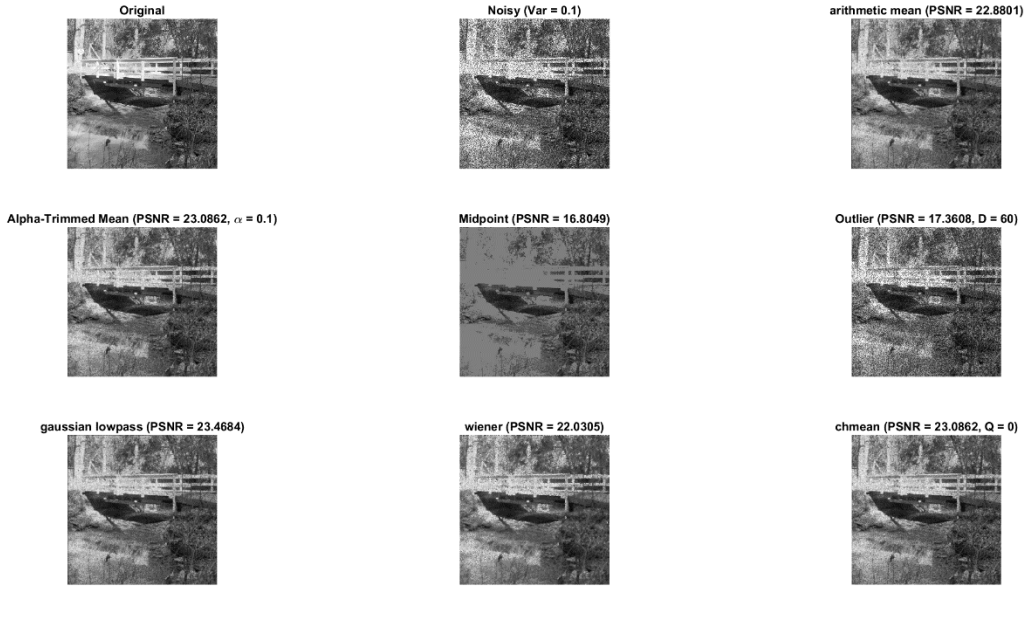
Noise density=0.1	Median	Alpha-trimmed	Midpoint	Outlier	Adaptive median
best kernel	3	5	15	5	3(max size)
Best PSNR	29.83	24.62	15.47	17.99	34.86
best param		$\sigma = 0.1$		$D = 70$	





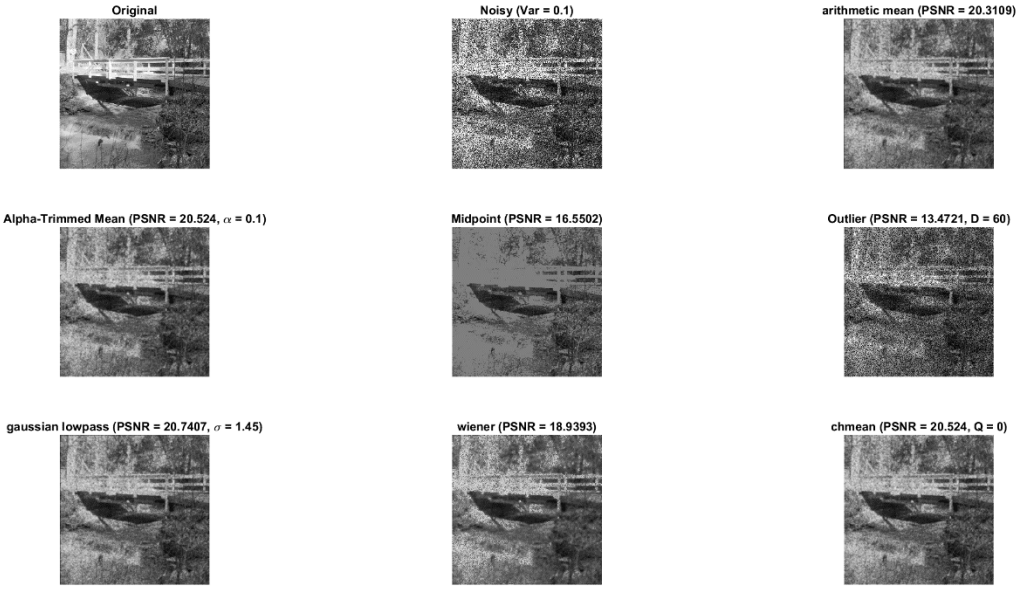
Noise density=0.4	Median	Alpha-trimmed	Midpoint	Outlier	Adaptive median
best kernel	5	9	5	11	7(max size)
Best PSNR	24.60	20.42	15.47	11.94	28.50
best param		$\sigma = 0.1$		$D = 76$	

Problem4



Name	Value
AMkernel	3
AMpsnr	22.8801
AMresult	512x512 uin...
ATalpha	0.1000
ATkernel	3
ATpsnr	23.0862
ATresult	512x512 uin...
CHkernel	3
CHpsnr	23.0862
CHresult	512x512 uin...
D	60
Gkernel	9
Gpsnr	23.4684
Gresult	512x512 uin...
Gsigma	0.9700
img	512x512 uin...
MPkernel	3
MPpsnr	16.8049
MPresult	512x512 uin...
noisy_img_1	512x512 uin...
noisy_img_2	512x512 uin...
Okernel	5
Opsnr	17.3608
Oresult	512x512 uin...
Q	0
Wkernel	5
Wpsnr	22.0305
Wresult	512x512 uin...

Var=0.1	Arithmetic mean	Gaussian	Wiener	Outlier	Alpha-trimmed	Midpoint	Contraharmonic
best kernel	3	9	5	5	3	5	3
Best PSNR	22.88	23.47	22.03	17.36	23.07	16.80	23.09
best param		$\sigma = 0.97$		$D = 60$	$\alpha = 0.1$		$Q = 0$



Name	Value
AMkernel	5
AMpsnr	20.3109
AMresult	512x512 uin...
ATalpha	0.1000
ATkernel	5
ATpsnr	20.5240
ATresult	512x512 uin...
CHkernel	5
CHpsnr	20.5240
CHresult	512x512 uin...
D	60
Gkernel	11
Gpsnr	20.7407
Gresult	512x512 uin...
Gsigma	1.4500
img	512x512 uin...
MPkernel	3
MPpsnr	16.5502
MPresult	512x512 uin...
noisy_img_1	512x512 uin...
noisy_img_2	512x512 uin...
Okernel	7
Opsnr	13.4721
Oresult	512x512 uin...
Q	0
Wkernel	7
Wpsnr	18.9393
Wresult	512x512 uin...

Var=0.3	Arithmetic mean	Gaussian	Wiener	Outlier	Alpha-trimmed	Midpoint	Contraharmonic
best kernel	5	11	7	7	5	3	5
Best PSNR	20.31	20.74	18.94	13.47	20.52	16.55	20.52
best param		$\sigma = 1.45$		$D = 60$	$\alpha = 0.1$		$Q = 0$

Discuss:

Kernel size 的範圍是 3~15 每次增加 2，σ的範圍是 0.1~2 每次遞增 0.1，α的範圍是 0.1~0.5 每次遞增 0.1，D 的範圍是 60~80 每次遞增 1，Q 的範圍是-3~3 每次遞增 1。

Problem2：可發現不論 var=0.05 或 0.2 時，這五個濾波器的 PSNR 值都差不多，且從肉眼看起來也並無明顯差別。

Problem3：肉眼可見 outlier 的效果特別差，尤其是在雜訊上升後 outliner psnr 又下降了不少。而 adaptive median 的效果特別好，可見其 PSNR 值較其他濾波器高出不少，且其還原的圖從肉眼來看跟原圖幾乎相差無幾。剩下的濾波器表現也都不錯，PSNR 都差不多，但效果都沒有 adaptive median 好。

Problem4：與第三題一樣 outliner 表現特別差，且 D 值都停留在 60(邊界值)，故我推測表現不佳的原因可能是因為 D 值範圍需要再做調整。而其他的濾波器表現都差不多，PSNR 值也相差不多。

特別要注意的是 midpoint 的結果在第三題出來不知為何是灰色的，我有特別寫一個 *test.m* 去檢查是否為函式問題，不過就結果而言這個 midpoint function 應該是沒問題的(如下圖，padding 為 replicate 的形式)。而在第四題測試的結果出來是有顯示出圖片的，故我推測第三題的灰色圖片可能與原圖的影像強度分布過於集中造成濾波效果不佳。