

mignotte@goldorak: ~/IFT3205CorrectionTPs/TpIFT3205_FiltreWiener/prog

mignotte@goldorak: ~/IFT3205CorrectionTPs/TpIFT3205_FiltreWiener/prog 182x41

```
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:23 cameraman_degraded.pgm
-rwx----- 1 mignotte mignotte 65610 Jul 21 15:19 cameraman.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:23 cameraman_restored.pgm
-rwx----- 1 mignotte mignotte 105 Jul 21 15:19 compilegcc
-rwx----- 1 mignotte mignotte 14639 Jul 21 15:19 FonctionDemo4.c
-rwx----- 1 mignotte mignotte 1603 Jul 21 15:19 FonctionDemo4.h
-rw-rw-r-- 1 mignotte mignotte 16416 Jul 29 22:23 FonctionDemo4.o
-rwxrwxr-x 1 mignotte mignotte 23451 Jul 29 22:23 Tp4_IFT3205-2-1
-rwx----- 1 mignotte mignotte 6236 Jul 21 15:19 Tp4_IFT3205-2-1.c
mignotte@goldorak:~/IFT3205CorrectionTPs/TpIFT3205_FiltreWiener/prog$ ./compilegcc Tp4_IFT3205-2-1
```

compilation du programme Tp4_IFT3205-2-1.c

mignotte@goldorak:~/IFT3205CorrectionTPs/TpIFT3205_FiltreWiener/prog\$./Tp4_IFT3205-2-1

----> Ouverture de cameraman.pgm

--Entete--

P5

CREATOR: XV Version 3.10a Rev: 12/29/94 (PNG patch 1.2)

256 256

255

```
Methode [1]
  size [9]
  variance noise [0.5000]
-----
```

Bruit > Moyenne=[0.002] Variance=[0.500]

Psf -1- Uniform Blur ([size:9x9] [noise:0.50]) -[halfsize=4]-

Sauvegarde de cameraman_restored au format pgm

Sauvegarde de cameraman_degraded au format pgm

> display cameraman_degraded.pgm&

> display cameraman.pgm&

> display cameraman_restored.pgm&

C'est fini ...

mignotte@goldorak:~/IFT3205CorrectionTPs/TpIFT3205_FiltreWiener/prog\$

ImageMagick: cameraman.p



ImageMagick: cameraman_



ImageMagick: cameraman_

mignotte@goldorak: ~/.../TpIFT3205_FiltreWiener/solution



mignotte@goldorak: ~/.../TpIFT3205_FiltreWiener/solution 182x39

mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution\$

compilation du programme Tp4_IFT3205.c

mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution\$

---> Ouverture de cameraman.pgm

--Entete--

P5

CREATOR: XV Version 3.10a Rev: 12/29/94 (PNG patch 1.2

256 256

255

Methode [1]
size [9]
variance noise [0.5000]

Bruit > Moyenne=[0.002] Variance=[0.500]

Psf -1- Uniform Blur ([size:9x9] [noise:0.50]) -[halfsize=4]- (BSNR1:37.9 dB) (BSNR2:37.9 dB)

True Wiener Filter

[ISNR = 3.0918]

Sauvegarde de cameraman_restored au format pgm

Sauvegarde de cameraman_degraded au format pgm

> display cameraman_degraded.pgm&

> display cameraman.pgm&

> display cameraman_restored.pgm&

C'est fini ...

mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution\$

ImageMagick: cameraman.p



ImageMagick: cameraman_



ImageMagick: cameraman_



```
-----  
Methode [1]  
  size [9]  
  variance noise [0.5000]  
-----
```

```
Bruit > Moyenne=[0.002] Variance=[0.500]  
Psf -1- Uniform Blur ([size:9x9] [noise:0.50]) -[halfsize=4]- (BSNR1:37.9 dB) (BSNR2:37.9 dB)
```

```
Iterative Wiener Filter
```

```
-----  
[0::ISNR = 3.0918]  
[1::ISNR = 3.6615]  
[2::ISNR = 3.8487]  
[3::ISNR = 3.9315]  
[4::ISNR = 3.9826]  
[5::ISNR = 4.0142]  
[6::ISNR = 4.0345]  
[7::ISNR = 4.0539]  
[8::ISNR = 4.0725]  
[9::ISNR = 4.0793]  
[10::ISNR = 4.0863]  
[11::ISNR = 4.0934]  
[12::ISNR = 4.0953]  
[13::ISNR = 4.0972]  
[14::ISNR = 4.0996]  
[15::ISNR = 4.1024]  
[16::ISNR = 4.1062]  
[17::ISNR = 4.1114]  
[18::ISNR = 4.1147]  
[19::ISNR = 4.1175]
```

```
Sauvegarde de cameraman_restored au format pgm
```

```
Sauvegarde de cameraman_degraded au format pgm
```

```
> display cameraman_degraded.pgm&  
> display cameraman.pgm&  
> display cameraman_restored.pgm&  
C'est fini ...
```

```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
```





```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$ ls -al
```

```
total 724
drwx----- 3 mignotte mignotte 4096 Jul 29 23:17 .
drwx----- 6 mignotte mignotte 4096 Jul 21 15:19 ..
-rwx----- 1 mignotte mignotte 65553 Jul 29 23:17 cameraman_degraded.pgm
-rwx----- 1 mignotte mignotte 65610 Jul 21 15:19 cameraman.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:59 cameraman_restored-2-0_ISNR_5.04dB.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:48 cameraman_restored-2-2_ISNR_3.09dB.pgm
-rwx----- 1 mignotte mignotte 65593 Jul 29 23:17 cameraman_restored-2-3_ISNR_5.05dB.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 21 15:19 cameraman_restored-3-1_ISNR_4.12dB.pgm
-rwx----- 1 mignotte mignotte 65553 Jul 29 23:17 cameraman_restored.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 21 15:19 cameraman_UB9x9_V0.5.pgm
-rwx----- 1 mignotte mignotte 105 Jul 21 15:19 compilegcc
-rwx----- 1 mignotte mignotte 21720 Jul 21 15:19 FonctionDemo4.c
-rwx----- 1 mignotte mignotte 2251 Jul 21 15:19 FonctionDemo4.h
-rw-rw-r-- 1 mignotte mignotte 23392 Jul 29 23:17 FonctionDemo4.o
-rw-rw-r-- 1 mignotte mignotte 2801 Jul 29 23:10 Nota_1.txt
-rw-rw-r-- 1 mignotte mignotte 4709 Jul 29 23:11 Nota_2.txt
-rwxrwxr-x 1 mignotte mignotte 45003 Jul 29 23:17 Tp4_IFT3205
-rwx----- 1 mignotte mignotte 25989 Jul 29 23:17 Tp4_IFT3205.c
-rwx----- 1 mignotte mignotte 25713 Jul 29 22:44 Tp4_IFT3205.c~
drwx----- 2 mignotte mignotte 4096 Jul 21 15:19 Ztmp
```

```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
```

```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
```

```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
```

xv 3.10a-20050501: camera



xv 3.10a-20050501: camera



xv 3.10a-20050501: camera



xv 3.10a-20050501: camera



Supplement au TP (non demande)

$$\hat{F}(u, \nu) = G(u, \nu) \left[\frac{H^*(u, \nu)}{|H(u, \nu)|^2 + \frac{\sigma^2}{|G(u, \nu)|^2}} \right]$$

ou $\frac{\sigma^2}{|F(u, \nu)|^2}$ remplace par: Cst=0.0015

Avec terme de correction (X=F et Y=G):

$$X^{[n+1]}(u, \nu) = Y(u, \nu) \left[\frac{H^*(u, \nu)}{|H(u, \nu)|^2 + \frac{\sigma^2}{|X^{[n]}(u, \nu)|^2}} \right]$$

$$\left| X^{[n+1]^+}(u, \nu) \right|^2 = \left| X^{[n+1]}(u, \nu) \right|^2 + \text{Cor}^{[n+1]}$$

$$\text{Cor}^{[n+1]} = \left| X^{[n]}(u, \nu) \right|^2 - \frac{\left| X^{[n+1]}(u, \nu) \right|^2 |H(u, \nu)|^2}{|H(u, \nu)|^2 + \frac{\sigma^2}{|X^{[n+1]}(u, \nu)|^2}}$$

A. D. Hillery and R. T. Chin, "Iterative Wiener filters for image restoration," *IEEE Trans. Signal Process.*, vol. 39, no. 8, pp. 1892–1899, Aug. 1991.

```
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$ ls -al
total 724
drwx----- 3 mignotte mignotte 4096 Jul 29 23:17 .
drwx----- 6 mignotte mignotte 4096 Jul 21 15:19 ..
-rwx----- 1 mignotte mignotte 65553 Jul 29 23:17 cameraman_degraded.pgm
-rwx----- 1 mignotte mignotte 65610 Jul 21 15:19 cameraman.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:59 cameraman_restored-2-0_ISNR_5.04dB.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 29 22:48 cameraman_restored-2-2_ISNR_3.09dB.pgm
-rwx----- 1 mignotte mignotte 65593 Jul 29 23:17 cameraman_restored-2-3_ISNR_5.05dB.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 21 15:19 cameraman_restored-3-1_ISNR_4.12dB.pgm
-rwx----- 1 mignotte mignotte 65553 Jul 29 23:17 cameraman_restored.pgm
-rwx----- 1 mignotte mignotte 65590 Jul 21 15:19 cameraman_UB9x9_V0.5.pgm
-rwx----- 1 mignotte mignotte 105 Jul 21 15:19 compilegcc
-rwx----- 1 mignotte mignotte 21720 Jul 21 15:19 FonctionDemo4.c
-rwx----- 1 mignotte mignotte 2251 Jul 21 15:19 FonctionDemo4.h
-rw-rw-r-- 1 mignotte mignotte 23392 Jul 29 23:17 FonctionDemo4.o
-rw-rw-r-- 1 mignotte mignotte 2801 Jul 29 23:10 Nota_1.txt
-rw-rw-r-- 1 mignotte mignotte 4709 Jul 29 23:11 Nota_2.txt
-rwxrwxr-x 1 mignotte mignotte 45003 Jul 29 23:17 Tp4_IFT3205
-rwx----- 1 mignotte mignotte 25989 Jul 29 23:17 Tp4_IFT3205.c
-rwx----- 1 mignotte mignotte 25713 Jul 29 22:44 Tp4_IFT3205.c~
drwx----- 2 mignotte mignotte 4096 Jul 21 15:19 Ztmp
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$ xv cameraman_restored-2-0_ISNR_5.04dB.pgm&
[5] 22030
[1] Done xv cameraman.pgm
[2] Done xv cameraman_degraded.pgm
[3] Done xv cameraman_restored-2-2_ISNR_3.09dB.pgm
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$ xv cameraman_restored-2-3_ISNR_5.05dB.pgm&
[6] 22050
mignotte@goldorak:~/.../TpIFT3205_FiltreWiener/solution$
```

