Manipulation et affichage d'images

Librairie PIL (Pillow)

```
from PIL import Image


im=Image.open("mon_image.jpg")
im.show()
```

Librairie PIL (Pillow)

Pour obtenir des informations sur le format

```
from PIL import Image

im=Image.open("mon_image.jpg")
print(im)
print(im.format,im.mode,im.size,im.palette)
print(im.info)
im.save("sortie.png","PNG")
```

enregistrement d'une nouvelle image
sur le disque

Lecture informations couleurs

```
import numpy as np

im=Image.open("mon_image.jpg")
v=np.array(im)
print(v.shape)
print(v)
```

Nx Ny 3

Modification d'une image

```
from PIL import Image
import numpy as np

im=Image.open("mon_image.jpg")
v=np.array(im)
v/=4.0
im=Image.fromarray(v)
im.show()
```

données des pixels

modification

création d'une image modifiée

Modification d'une image

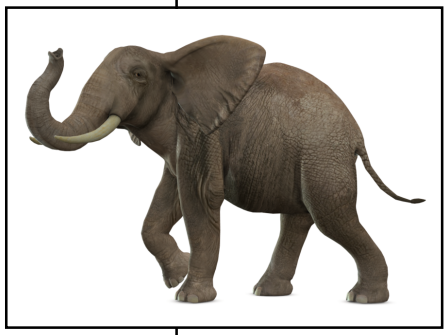
```
from PIL import Image
import numpy as np

im=Image.open("mon_image.jpg")
v=np.array(im)

r=v[:,:,0]
g=v[:,:,1]
b=v[:,:,2]
g/=1.3
b/=1.5

v2=np.zeros((150,200,3),dtype='uint8')
v2[:,:,0]=r
v2[:,:,1]=g
v2[:,:,1]=b

im=Image.fromarray(v2)
im.show()
```

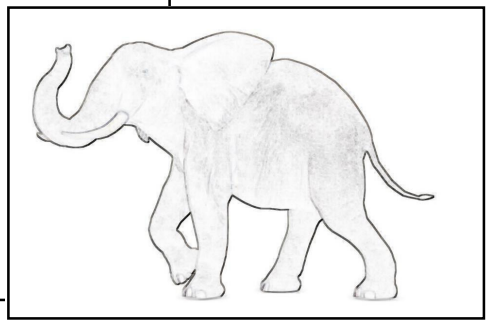
Canaux R,G,B

Reconstruction de l'image

Contours d'une image

```
from PIL import Image
import numpy as np

im=Image.open("elephant.png")
v=np.array(im,dtype='int')

dx=np.zeros_like(v,dtype='int')
dy=np.zeros_like(v,dtype='int')
Nx,Ny,dim=v.shape

for kx in range(Nx-1):
    for ky in range(Ny-1):
        dx[kx,ky,:]=abs(v[kx+1,ky,:]-v[kx,ky,:])
        dy[kx,ky,:]=abs(v[kx,ky+1,:]-v[kx,ky,:])

dx=np.array(dx,dtype='uint8')
dy=np.array(dy,dtype='uint8')

Image.fromarray(dx).show()
Image.fromarray(dy).show()
Image.fromarray(dx+dy).show()
```





Contours d'une image

```
from PIL import Image
import numpy as np

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v=np.array(im,dtype='int')

dx=np.zeros_like(v,dtype='int')
dy=np.zeros_like(v,dtype='int')
Nx,Ny,dim=v.shape
```
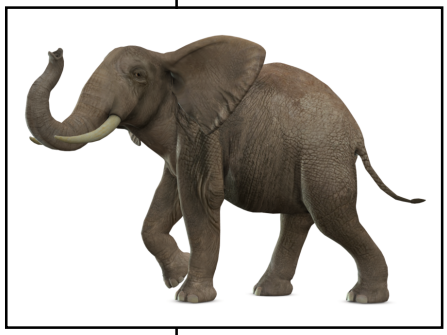
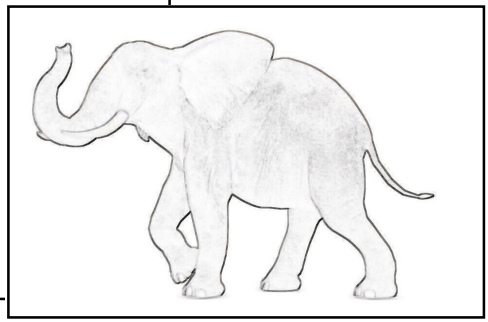



version vectorielle

```
dx[1:,:,:]=abs(v[1:,:,:]-v[:-1,:,:])
dy[:,1:,:]=abs(v[:,1:,:]-v[:,:-1,:])

dx=np.array(dx,dtype='uint8')
dy=np.array(dy,dtype='uint8')

Image.fromarray(dx).show()
Image.fromarray(dy).show()
Image.fromarray(dx+dy).show()
```



Application: conversion

Convertir une image couleur en noir et blanc.

Application: conversion

Convertir une image couleur en noir et blanc.

```
from PIL import Image
import numpy as np

im=Image.open("mon_image.jpg")
v=np.array(im,dtype='int')

r=v[:,:,0]
g=v[:,:,1]
b=v[:,:,2]

gray=(r+g+b)/3

for k in range(3):
    v[:,:,k]=gray

Image.fromarray(np.array(v,dtype='uint8')).show()
```

Application: segmentation

Afficher en rouge clair tous pixel de niveau de gris supérieur à 150

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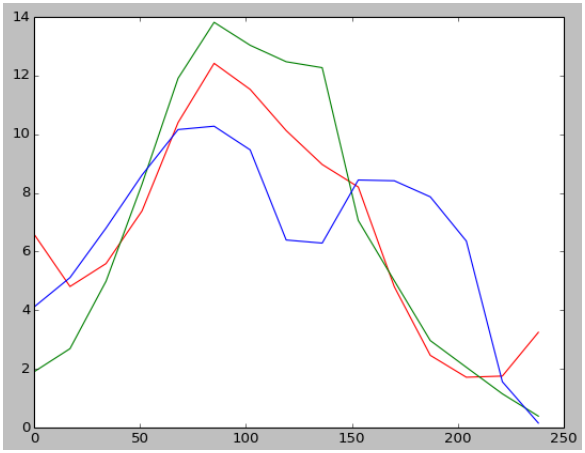
Afficher en rouge clair tous pixel de niveau de gris supérieur à 150

```
im=Image.open("mon_image.jpg")
v=np.array(im,dtype='int')

r=v[:,:,0]
g=v[:,:,1]
b=v[:,:,2]

gray=(r+g+b)/3

Nx,Ny,dim=v.shape

for kx in range(Nx):
  for ky in range(Ny):
    value=gray[kx,ky]
    if value>150:
      v[kx,ky,0]=255
      v[kx,ky,1]=0
      v[kx,ky,2]=0
```

Application: histogramme

Construire l'histogramme des couleurs rouges vertes et bleue d'une image



Application: histogramme

Construire l'histogramme des couleurs rouges vertes et bleue d'une image

```
from PIL import Image
import numpy as np
import matplotlib.pyplot as plt

im=Image.open("paysages2.jpg")
v=np.array(im,dtype='int')

r=v[:,:,0]
g=v[:,:,1]
b=v[:,:,2]

hr=np.histogram(r,15)
hg=np.histogram(g,15)
hb=np.histogram(b,15)

N=sum(hr[0])

plt.plot(hr[1][:-1],hr[0]/N*100,"r")
plt.plot(hg[1][:-1],hg[0]/N*100,"g")
plt.plot(hb[1][:-1],hb[0]/N*100,"b")

plt.show()
```