PRACTICAL CLASS 1

1. READ, VISUALIZE AND WRITE IMAGES

1.1 Read image **lena.tif**.

```
from imageio import imread, imwrite
Img = imread('nome da imagem.tiff')
```

1.2 Image components, type and dimensions.

```
dim = Img.shape
tipo = Img.dtype
npix = Img.size

In [6]: dim, tipo, npix
Out[6]: ((256, 256, 3), dtype('uint8'), 196608)
```

1.3 Show image on the screen.

```
import matplotlib.pyplot as plt
# Representar imagem
plt.figure
plt.imshow(Img)
```

1.4 Separate the RGB image in its components R, G and B, and show them on the screen.

```
plt.figure(figsize=(12, 3))
plt.subplot(141); plt.imshow(Img)
plt.title('Inicial'); plt.axis('off')
plt.subplot(142); plt.imshow(Img[:,:,0], 'gray')
plt.title('R'); plt.axis('off')
plt.subplot(143); plt.imshow(Img[:,:,1], 'gray')
plt.title('G'); plt.axis('off')
plt.subplot(144); plt.imshow(Img[:,:,2], 'gray')
plt.title('B'); plt.axis('off')
```

1.5 Write images on the disk.

```
# Gravar imagens no disco
imwrite(path + nome + '_R' + ext, Img[:, :, 0])
imwrite(path + nome + '_G' + ext, Img[:, :, 1])
imwrite(path + nome + '_B' + ext, Img[:, :, 2])
```

2. BASIC IMAGE OPERATIONS

2.1 Obtain the value of a pixel.

```
val = Img[25,31,0] # pixel (25,31) da primeira banda da imagem Img
```

2.2 Image *Slicing*: crop the image **lena.tif**, to obtain aproximatelly the image below (dimensions of 15×60).

```
# Fazer crop da imagem pelas coordenadas pixel dos CSE e CID
linha_cse =
coluna_cse =
linha_cid =
coluna_cid =
cropImg = Img[linha_cse:linha_cid,coluna_cse:coluna_cid,:]
plt.figure(); plt.imshow(cropImg);
plt.title('Crop'); plt.axis('off')
```


Crop
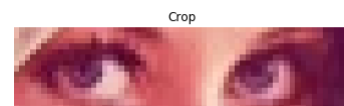
Replace, on the initial image, the correspondent pixels by a constant value.

Incógnita

```python
Img1 = Img*1
Img1[linha_cse:linha_cid,coluna_cse:coluna_cid,:] = 10
plt.figure(); plt.imshow(Img1)
plt.title(u'Incógnita'); plt.axis('off')
```

2.3 Plot a given image profile.

```python
# Plot de perfis
import numpy as np
import scipy.ndimage

# Construir uma linha com "num" pontos entre os pontos de coordenadas
# (linha, coluna): (y0,x0) e (y1,x1)
y0, x0 = 100, 50
y1, x1 = 200, 200
num = 100
y, x = np.linspace(y0, y1, num), np.linspace(x0, x1, num)

# Extrair os valores dos pixels ao longo da linha
d = np.vstack((y,x))
perfil = scipy.ndimage.map_coordinates(Img[:,:,0], d)

# Plot...
plt.figure(figsize=(15, 3))
plt.subplot(121); plt.imshow(Img[:,:,0], 'gray')
plt.title('Inicial'); plt.axis('off')
plt.plot([x0, x1], [y0, y1], 'ro-')
plt.subplot(122); plt.plot(perfil,'ro--')
plt.title('Perfil')
```