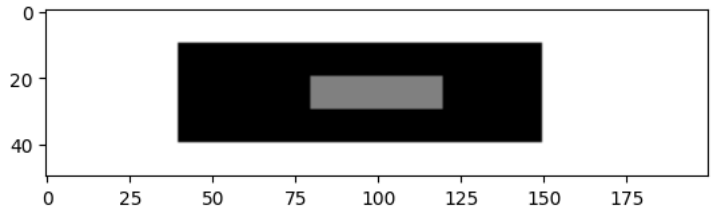
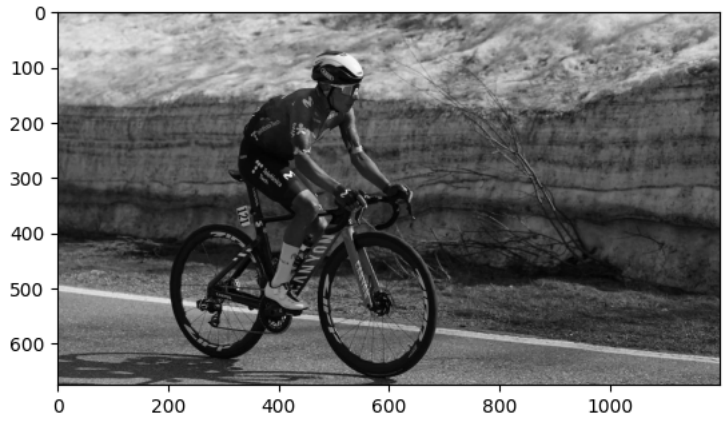
```
import numpy as np
import matplotlib.pyplot as plt

alto = 50
ancho = 200
mi_arreglo = np.zeros((alto,ancho))

print('La dimension del arrelo es',mi_arreglo.shape)
#mi_arreglo[10,10] = 1
mi_arreglo[10:40,40:150]=1
mi_arreglo[20:30,80:120]=0.5
plt.imshow(-mi_arreglo, cmap='gray')
```

```
La dimension del arrelo es (50, 200)
<matplotlib.image.AxesImage at 0x7c305db969e0>
```




```
import cv2
arch = 'bici.jpg'
img_tmp=plt.imread(arch)
img_tmp_2=cv2.imread(arch,0)
#plt.imshow(img_tmp)
print(img_tmp_2.shape)
plt.imshow(img_tmp_2,cmap='gray')
```

```
(675, 1200)
<matplotlib.image.AxesImage at 0x7c305d649780>
```




```
import keras
from keras.layers import Input ,Dense, Conv2D, MaxPooling2D, Flatten
from keras.models import Sequential, Model

img= img_tmp_2
h,w= img.shape
print(img.shape)
```

```
(675, 1200)
```

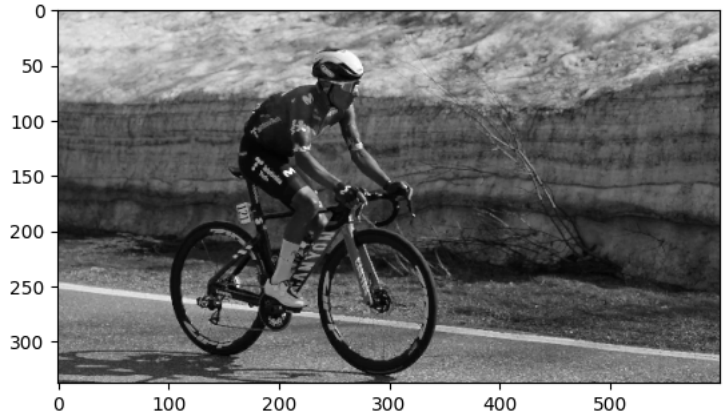
```
input_img = Input(shape=(h,w,1))
x = Conv2D(1, (1,1), activation='relu', padding='same')(input_img)
#modelo1 = Model(inputs=input_img, outputs=x)

modelo1 = Model(input_img,x)
modelo1.set_weights([np.array([[[[100.0]]]],dtype=np.float32),np.array([-50],dtype=np.float32)])

img = img.reshape(1,675,1200,1)
img1 = modelo1.predict(img)

print(img1.shape)
```

```
plt.imshow(img1.reshape(675,1200),cmap='gray')
#modelo1.summary()
```

```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 416ms/step
(1, 675, 1200, 1)
<matplotlib.image.AxesImage at 0x7c2fe1d6b250>
```

```
input_img = Input(shape=(h,w,1))
x = Conv2D(1, (1,1), activation='relu', padding='same')(input_img)
x = MaxPooling2D(pool_size=(2,2),padding='same')(x)
#modelo1 = Model(inputs=input_img, outputs=x)

modelo1 = Model(input_img,x)
modelo1.set_weights([np.array([[[[100.0]]]],dtype=np.float32),np.array([-50],dtype=np.float32)])

img = img.reshape(1,675,1200,1)
img1 = modelo1.predict(img)

print(img1.shape)
plt.imshow(np.reshape(img1[0,:,:,0],(338,600,1)),cmap='gray')
#modelo1.summary()
```

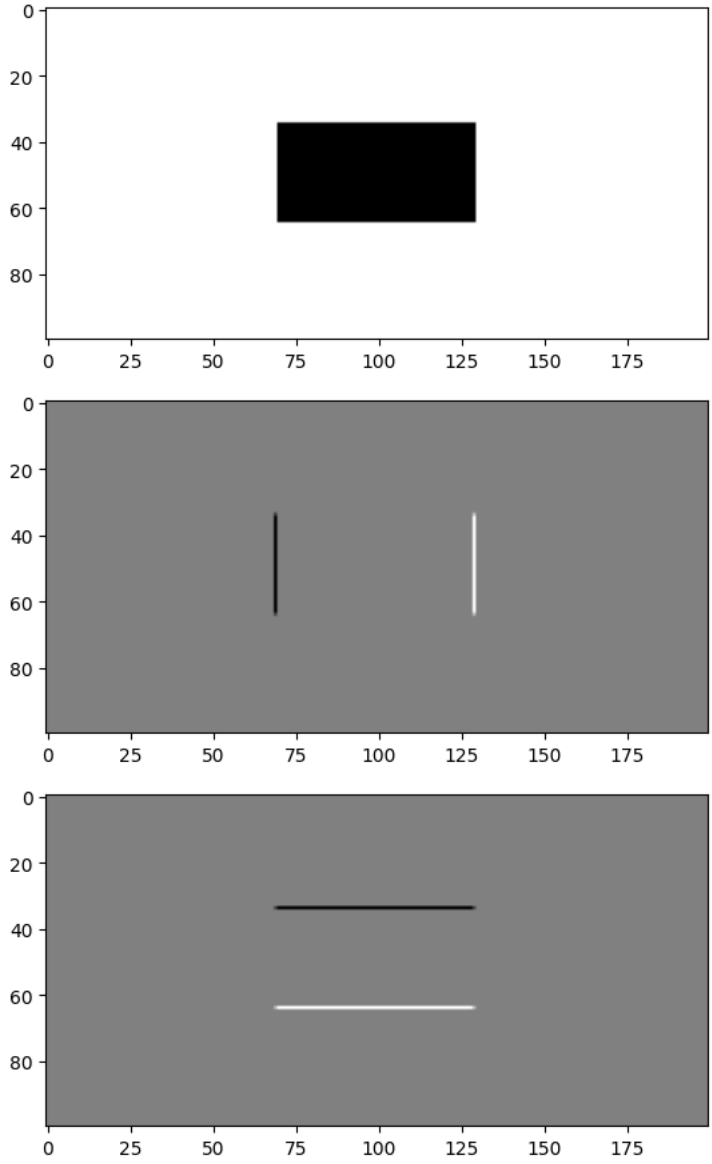
```
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 112ms/step
(1, 338, 600, 1)
<matplotlib.image.AxesImage at 0x7c2feb68da20>
```



```
def reformar_filtros(filtros):
  l=len(filtros)
  m=len(filtros[0])
  n=len(filtros[0][0])
  salida=np.zeros((m,n,1,l))
  print('arreglo',l,n,m,salida.shape)
  for i in range(l):
    for j in range(m):
      for k in range(n):
        #print('ijk',i,j,k,filtros[i][j][k])
        salida[j,k,0,i]=filtros[i][j][k]
  return salida

import numpy as np
import matplotlib.pyplot as plt

```

```
alto = 100
ancho = 200
mi_arreglo = np.zeros((alto,ancho))

print('La dimension del arreglo es',mi_arreglo.shape)
#mi_arreglo[20:80,40:160]=0.5
mi_arreglo[35:65,70:130]=1
plt.imshow(-mi_arreglo, cmap='gray')

input_img = Input(shape=(100,200,1))
x = Conv2D(2, (2,2), activation='linear', padding='same')(input_img)
modelo3 = Model(input_img,x)

filtro1 = [
    [1,-1],
    [1,-1]
]

filtro2 = [
    [1,1],
    [-1,-1]
]

filtros = reformar_filtros([filtro1, filtro2])

modelo3.set_weights([filtros,np.array([0,0],dtype=np.float32)])
img_mod3 = modelo3.predict(mi_arreglo.reshape(1,100,200,1))

print(img_mod3.shape)
img_filtered_1 = np.reshape(img_mod3[0,:,:,0],(100,200,1))
img_filtered_2 = np.reshape(img_mod3[0,:,:,1],(100,200,1))

plt.figure()
plt.imshow(img_filtered_1,cmap='gray')

plt.figure()
plt.imshow(img_filtered_2,cmap='gray')

```

```
La dimension del arreglo es (100, 200)
arreglo 2 2 2 (2, 2, 1, 2)
1/1 ━━━━━━━━━━━━━━━━━━━━ 0s 44ms/step
(1, 100, 200, 2)
<matplotlib.image.AxesImage at 0x7c2fe1eb45e0>
```



```
def reformar_filtros(filtros):
  l=len(filtros)
  m=len(filtros[0])
  n=len(filtros[0][0])
  salida=np.zeros((m,n,1,l))
  print('arreglo',l,n,m,salida.shape)
  for i in range(l):
    for j in range(m):
      for k in range(n):
        #print('ijk',i,j,k,filtros[i][j][k])
        salida[j,k,0,i]=filtros[i][j][k]
  return salida

import numpy as np
import matplotlib.pyplot as plt

alto = 100
ancho = 200
mi_arreglo = np.zeros((alto,ancho))

print('La dimension del arreglo es',mi_arreglo.shape)
#mi_arreglo[20:80,40:160]=0.5
mi_arreglo[35:65,70:130]=1
plt.imshow(-mi_arreglo, cmap='gray')
```

```
25
26 input_img = Input(shape=(100,200,1))
27 x = Conv2D(3, (3,3), activation='linear', padding='same')(input_img)
28 modelo4 = Model(input_img,x)
29
30 filtro1=[
31       [ 1, 0,-1],
32       [ 1, 0,-1],
33       [ 1, 0,-1]]
34 filtro2=[
35     [ 1, 1, 1],
36     [ 0, 0, 0],
37     [-1,-1,-1]]
38 filtro3=[
39   [  1,  2,  1],
40   [  2,-12,  2],
41   [  1,  2,  1]]
42
43 filtros=reformar_filtros([filtro1,filtro2,filtro3])
44
45 modelo4.set_weights([filtros,np.array([0,0,0],dtype=np.float32)])
46 img_mod4 = modelo4.predict(mi_arreglo.reshape(1,100,200,1))
47
48 print(img_mod4.shape)
49 img_filtered_1_mod4 = np.reshape(img_mod4[0,:,:,0],(100,200,1))
50 img_filtered_2_mod4 = np.reshape(img_mod4[0,:,:,1],(100,200,1))
51 img_filtered_3_mod4 = np.reshape(img_mod4[0,:,:,2],(100,200,1))
52
53 plt.figure()
54 plt.imshow(img_filtered_1_mod4,cmap='gray')
55
56 plt.figure()
57 plt.imshow(img_filtered_2_mod4,cmap='gray')
58
59 plt.figure()
60 plt.imshow(img_filtered_3_mod4,cmap='gray')
```