3. Picture shift

Convert the original image src to the target image dst by the conversion matrix M:

dst(x, y) = src(M11x + M12y+M13, M21x+M22y+M23)

Moving the original image src 200 pixels to the right and 100 pixels to down, the corresponding relationship is:

dst(x, y) = src(x+200, y+100)

Complete the above expression according to the formula, as shown below.

dst(x, y) = src(1·x + 0·y + 200, 0·x + 1·y + 100)

According to the above expression, we can determine the value of each element in the corresponding conversion matrix M, as shown below.

M11=1
M12=0
M13=200
M21=0
M22=1
M23=100

Substituting the above values into the transformation matrix M, we can get,

M = []

Next, we directly use the conversion matrix M to call the function **cv2.warpAffine ()** to complete the translation of the image.

Code path:

/home/pi/Yahboom_Project/Raspbot/1.OpenCV_course/02Geometric_transformation/03_Picture_shift.ipynb

```
import cv2

import numpy as np

img = cv2.imread('yahboom.jpg',1)

#cv2.imshow('src',img)

imgInfo = img.shape

height = imgInfo[0]

width = imgInfo[1]
```

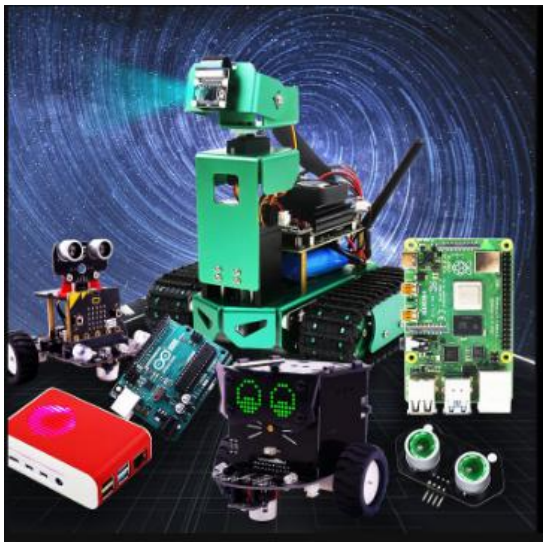
```
####

matShift = np.float32([[1,0,200],[0,1,100]])# 2*3

dst = cv2.warpAffine(img, matShift, (height, width))        #1 data 2 mat 3 info

# Shift matrix

# cv2.imshow('dst',dst)

# cv2.waitKey(0)
```

After running the following program, two images will be displayed in the jupyterLab control interface, that is original image and the translated image.

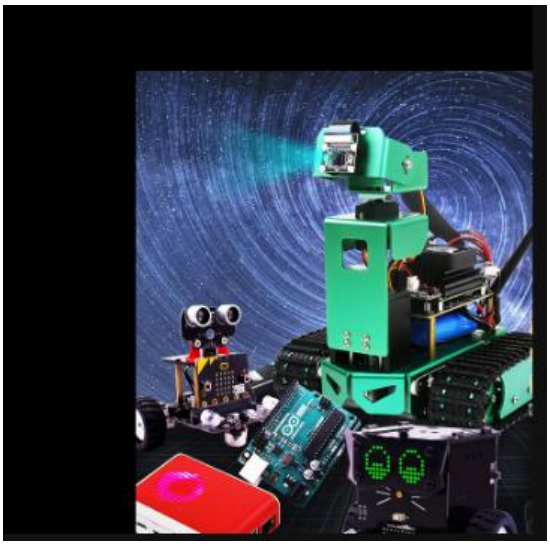
```
#bgr 8 to jpeg format

import enum

import cv2



def bgr8_to_jpeg(value, quality=75):

        return bytes(cv2.imencode('.jpg', value)[1])
```

```
import ipywidgets.widgets as widgets



image_widget1 = widgets.Image(format='jpg', )

image_widget2 = widgets.Image(format='jpg', )

# create a horizontal box container to place the image widget next to eachother

image_container = widgets.HBox([image_widget1, image_widget2])
```

```
# display the container in this cell's output

display(image_container)

#display(image_widget2)



img1 = cv2.imread('yahboom.jpg',1)

image_widget1.value = bgr8_to_jpeg(img1)

image_widget2.value = bgr8_to_jpeg(dst)
```



[Original picture]



[Shift picture]

According to the above picture, this picture has moved to the lower right corner (200, 100).