

8. Picture pan

The original image `src` is converted into the target image `dst` through the transformation matrix `M`:

$$\text{dst}(x, y) = \text{src}(M_{11}x + M_{12}y + M_{13}, M_{21}x + M_{22}y + M_{23})$$

Move the original image `src` to the right by 200 and down by 100 pixels, then the corresponding relationship is:

$$\text{dst}(x, y) = \text{src}(x+200, y+100)$$

Complete the above expression, that is:

$$\text{dst}(x, y) = \text{src}(1 \cdot x + 0 \cdot y + 200, 0 \cdot x + 1 \cdot y + 100)$$

According to the above expression, it can be determined that the value of each element in the corresponding transformation matrix `M` is:

`M11=1`

`M12=0`

`M13=200`

`M21=0`

`M22=1`

`M23=100`

Substituting the above values into the transformation matrix `M`, we get:

$$M = \begin{bmatrix} 1 & 0 & 200 \\ 0 & 1 & 100 \end{bmatrix}$$

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

Code path: `muto/Samples/OpenCV/02_OpenCV Transform/03Picture Pan.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)
```

The following will display the comparison between the original image and the translated image in the jupyterLab control:

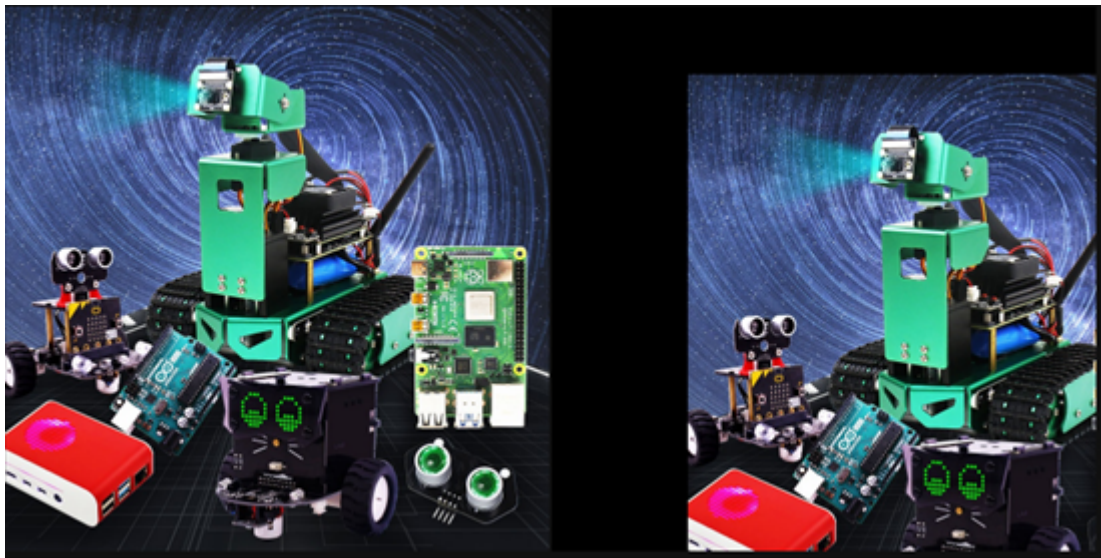
```
#bgr8 to jpeg format
import enum
import cv2
def bgr8_to_jpeg(value, quality=75):
    return bytes(cv2.imencode('.jpg', value)[1])
```

```
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)
```



As can be seen from the image, the picture has moved to the lower right corner (200, 100).