3. Image translation

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

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

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

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

Complete the above expression, that is:

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

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

The code is running on jupyter lab

Code path: /home/pi/Yahboom_Project/1.OpenCV course/02Geometric transformation/03_Picture translation.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 each other

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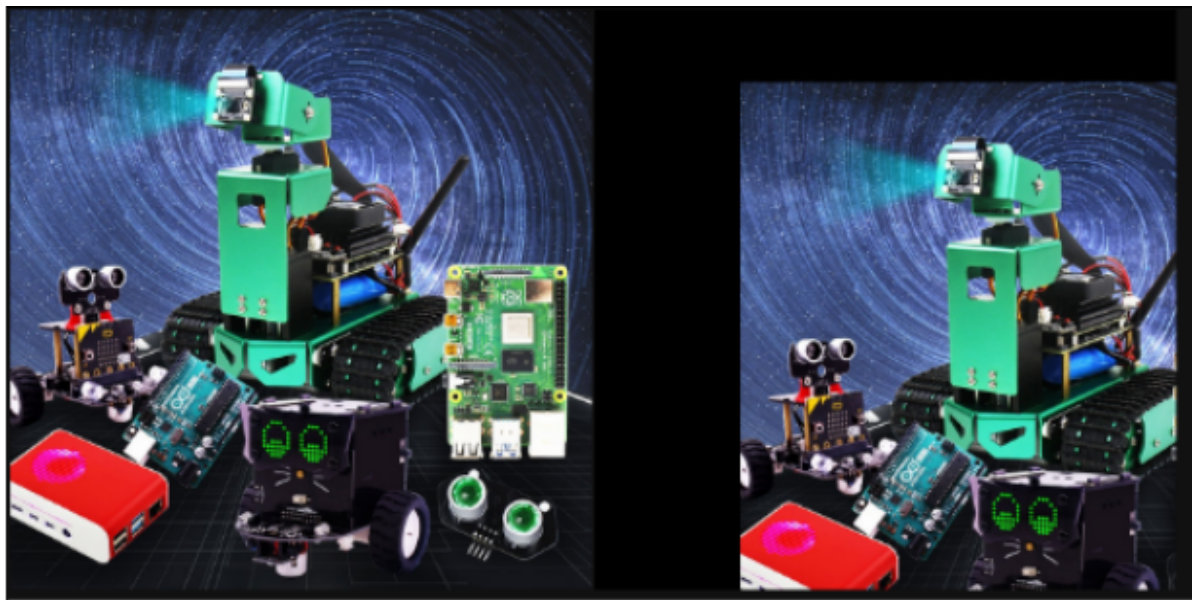
As can be seen from the image, the image has moved to the lower right corner (200, 100)