Label Code Recognition

For Orin board users, directly open a web page and enter the IP address:8888 to access jupyter-lab and run directly. For Jetson-Nano board users, you need to first enter the docker container, then enter the following command in docker:

```
cd
jupyter-lab --allow-root
```

Then open a web page and enter the IP address:9999 to access jupyter-lab and run the following program.

1. Introduction

Apriltag label codes are coded markers commonly used in machine vision. They have high recognition rates and reliability, and can be used for various tasks including augmented reality, robotics, and camera calibration.

2. Startup

2.1. Preparation Before Program Startup

This apriltag label code uses the TAG36H11 format. The factory has already equipped the corresponding label codes and attached them to building blocks. You need to take out the building blocks and place them under the camera view for recognition.

2.2. Source Code

Code path:

```
#Jetson-Nano users need to enter the docker container to view
~/dofbot_pro/dofbot_basic_visual/scripts/07.Apriltag_Recognition.ipynb
```

```
import cv2 as cv
import threading
import random
from time import sleep
import ipywidgets as widgets
from IPython.display import display
from apriltag_identify import ApriltagIdentify
from dofbot_utils.fps import FPS
from dofbot_utils.robot_controller import Robot_Controller
```

```
apriltag_Identify = ApriltagIdentify()
model = 'General'
```

```
robot = Robot_Controller()
robot.move_look_map()
fps = FPS()
```

```
button_layout      = widgets.Layout(width='320px', height='60px',
align_self='center')
output = widgets.Output()
# exit
exit_button = widgets.Button(description='Exit', button_style='danger',
layout=button_layout)
# Image widget
imgbox = widgets.Image(format='jpg', height=480, width=640,
layout=widgets.Layout(align_self='center'))
# Vertical layout
display_box = widgets.VBox([imgbox, exit_button],
layout=widgets.Layout(align_self='center'))
```

```
def exit_button_Callback(value):
    global model
    model = 'Exit'

exit_button.on_click(exit_button_Callback)
```

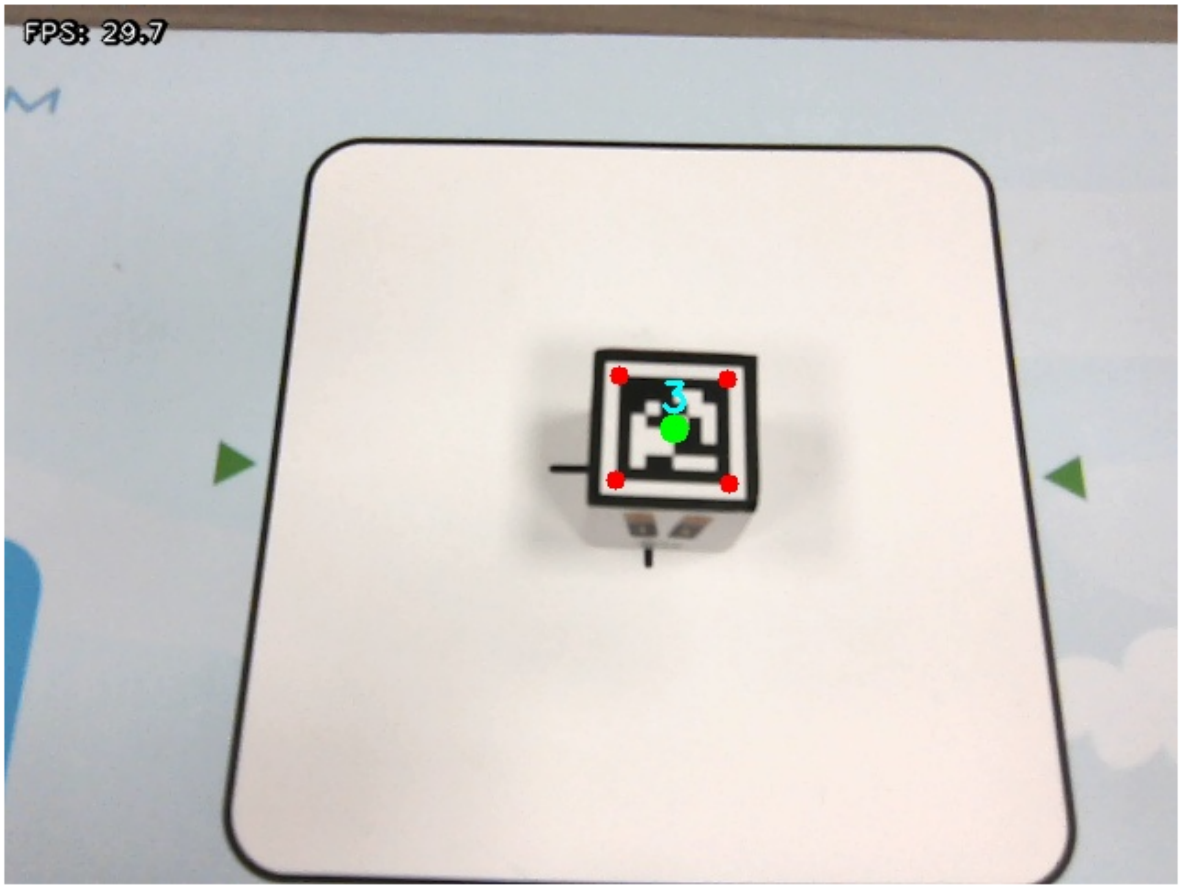
```
def camera():
    global HSV_learning,model
    # Open camera
    capture = cv.VideoCapture(0)
    capture.set(3, 640)
    capture.set(4, 480)
    capture.set(5, 30)
    # Be executed in loop when the camera is opened normally
    while capture.isOpened():
        try:
            _, img = capture.read()
            fps.update_fps()
            img, msg = apriltag_Identify.getApriltagPosition(img)
            if model == 'Exit':
                capture.release()
                break
            fps.show_fps(img)
            imgbox.value = cv.imencode('.jpg', img)[1].tobytes()
        except Exception as e:
            print("program end")
            print(e)
            capture.release()
```

```
display(display_box,output)
threading.Thread(target=camera, ).start()
```

2.3. Program Description

Click the "Run entire program" button on the jupyterlab toolbar, then scroll to the bottom to see the camera component display.

Place the label code into the camera view, and the system will recognize and frame the four vertices of the label code, displaying the label code's ID number.



Exit

If you need to exit the program, please click the [Exit] button.