

# Action learning

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## Action learning

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## 1. Introduction

This course mainly uses dogzilla to read the angle of the steering gear and write the angle of the steering gear. The idea of action learning is to record each attitude into the local TXT file, and multiple gestures run in turn to form an action.

## 2. Code analysis

Create multiple buttons to control functions. If you need to display Chinese, please set G\_ENABLE\_CHINESE = True.

```
# 中文开关, 默认为英文 Chinese switch. The default value is English
g_ENABLE_CHINESE = False

Name_widgets = {
    'Stop_Study': ("Stop_Study", "停止学习"),
    'Start_Study': ("Start_Study", "开始学习"),
    'Study_Action': ("Study_Action", "记录动作"),
    'Clear_Action': ("Clear_Action", "清空动作组"),
    'Play_Action': ("Play_Action", "运行动作组")
}
```

PATH\_Action records the location where the action is saved. In order to facilitate viewing, the text file is placed in the same directory of the program. Generally, it does not need to be modified.

```
PATH_ACTION = "/home/pi/DOGZILLA/Samples/3_AI_Visual/Action_Data.txt"
```

Since the robot dog needs to unload the two front leg rudders for action learning, it needs to sit down first, otherwise it will not be able to keep the state when starting the learning.

```
# 恢复默认姿态, 并且把机器狗坐着摆放
# Restore the default position and place the robot dog in a sitting position
g_dog.reset()
```



Start to learn the action and unload the two front leg steering gear.

```
# 开始学习动作, 卸载两个前腿舵机  
# Start learning the moves, unloading both front leg steering gear  
def start_study():  
    g_dog.unload_motor(1)  
    time.sleep(.1)  
    g_dog.unload_motor(2)
```

Learn the action, read the steering angle of the robot dog's current posture, and open and write a line of data (two front leg steering angle values) using Python's built-in open function.

```
# 学习动作, 记录并保存当前动作到文件里  
# Learn the action, record and save the current action to a file  
def study_action():  
    read_angle = g_dog.read_motor(True)  
    leg_angle = [0, 0, 0, 0, 0, 0]  
    for i in range(6):  
        leg_angle[i] = read_angle[i]  
    write_action(PATH_ACTION, leg_angle)
```

```
# 写入动作 Write action
def write_action(wf_path, value):
    if len(value) != 6:
        return
    with open(wf_path, "a") as wf:
        wf_str = str(value[0]) + ', ' + str(value[1]) + ', ' + \
            str(value[2]) + ', ' + str(value[3]) + ', ' + \
            str(value[4]) + ', ' + str(value[5]) + '\n'
        wf.write(wf_str)
        wf.flush()
```

Stop the learning action and reload the two front leg servos.

```
# 停止学习动作 Stop Learning the action
def stop_study():
    g_dog.load_motor(1)
    time.sleep(.1)
    g_dog.load_motor(2)
```

Read all actions, read the actions in the TXT text line by line, and save them to the group.

```
# 读取所有动作 Read all actions
def read_all_action():
    rf = open(PATH_ACTION, "r+")
    lines = rf.readlines()
    group = ()
    for line in lines:
        if len(line) != 0:
            list = line.split(',')
            if len(list) == 6:
                action = ([int(list[0]), int(list[1]), int(list[2]),
                    int(list[3]), int(list[4]), int(list[5])], )
                group = group + action
    rf.flush()
    return group
```

Run the action group and run the read group action groups in sequence

```
# 运行动作组 Operation action group
def play_action():
    group = read_all_action()
    len_group = len(group)
    print("group:", len_group, group)
    motor_id = [11, 12, 13, 21, 22, 23]
    g_dog.motor_speed(50)
    index = 0
    for action in group:
        g_dog.motor(motor_id, action)

        if index == 4 or index == 3:
            time.sleep(.5)
        else:
            time.sleep(1.2)
        index = index + 1
```

The clearing action is relatively simple, and the path is deleted PATH\_ACTION file. Note that the previous action data cannot be recovered after clearing.

```
# 清除动作, 删除PATH_ACTION文件 Clear ACTION to delete the PATH_ACTION file
def clear_action():
    os.system('rm ' + PATH_ACTION)
```

## 1.3 Steps

Open the jupyterlab client and find the code path.

```
DOGZILLA/Samples/3_AI_Visual/13.study_mode.ipynb
```

Click run all cells, and then drag to the bottom to see the generated control.

First, click start\_Study begins to learn. At this time, the two front legs of the robot dog will be unloaded, and the two front legs can be rotated by hand for six steering angles.

When turning to the posture to be learned, click study\_Action learn to record a gesture, and repeatedly record several gestures to form a group of actions.

After completing the action learning, please click Stop\_Study the end of the study, the robot dog's two front legs and the steering gear are reloaded.

Click play\_Action starts playing the just learned action.

When you need to clear the action or learn the action again, please click the Clear\_Action to clear the action data.