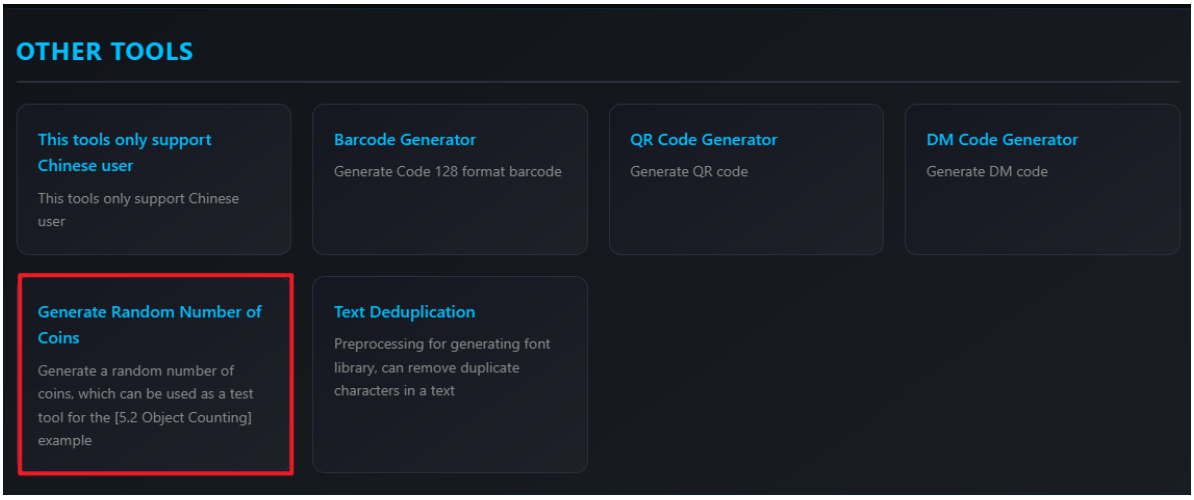
Object counting

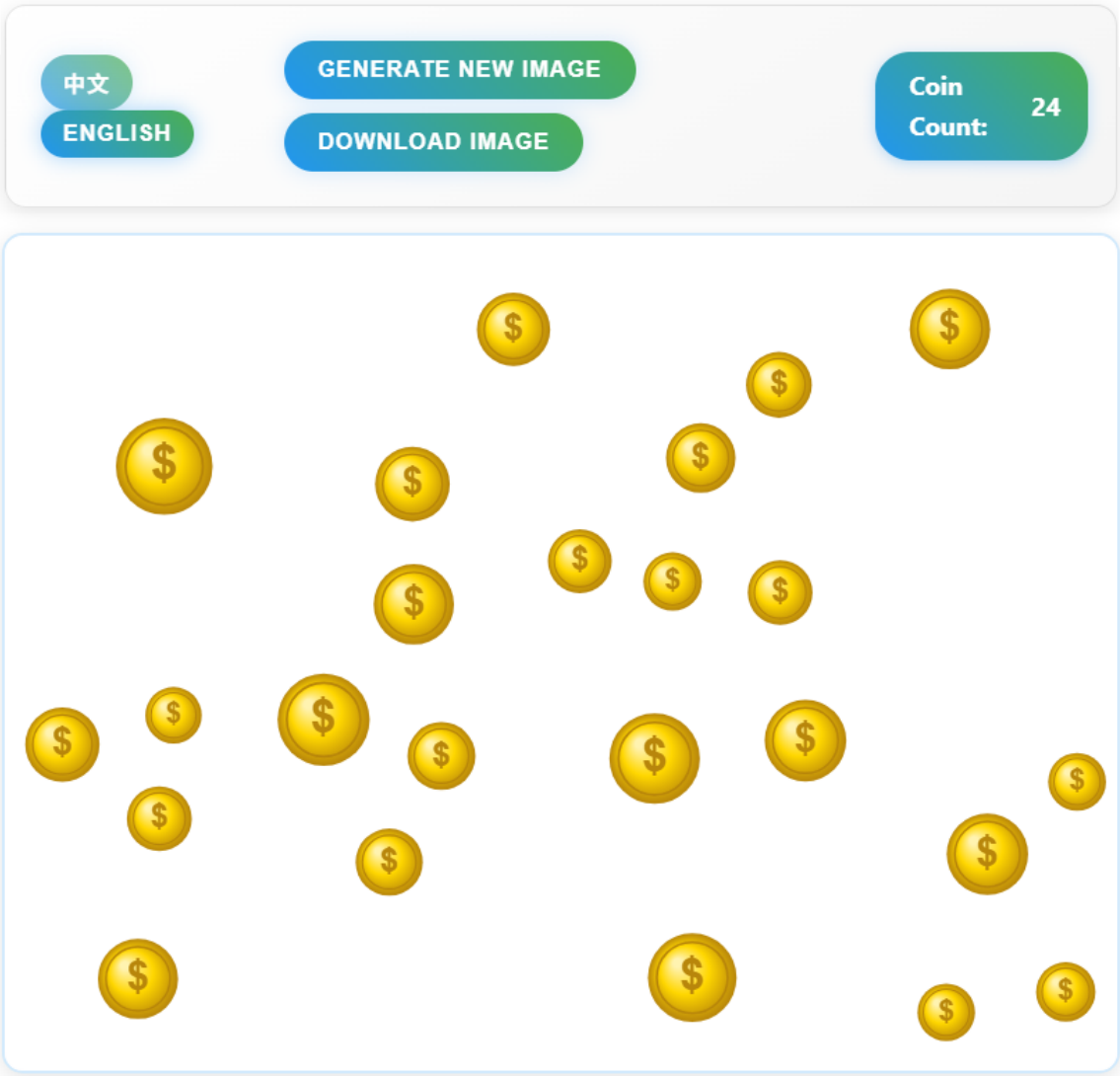
Introduction to the results of routine experiments

Based on the color recognition we learned in the previous section, in this section we will try to count the number of objects with similar colors.

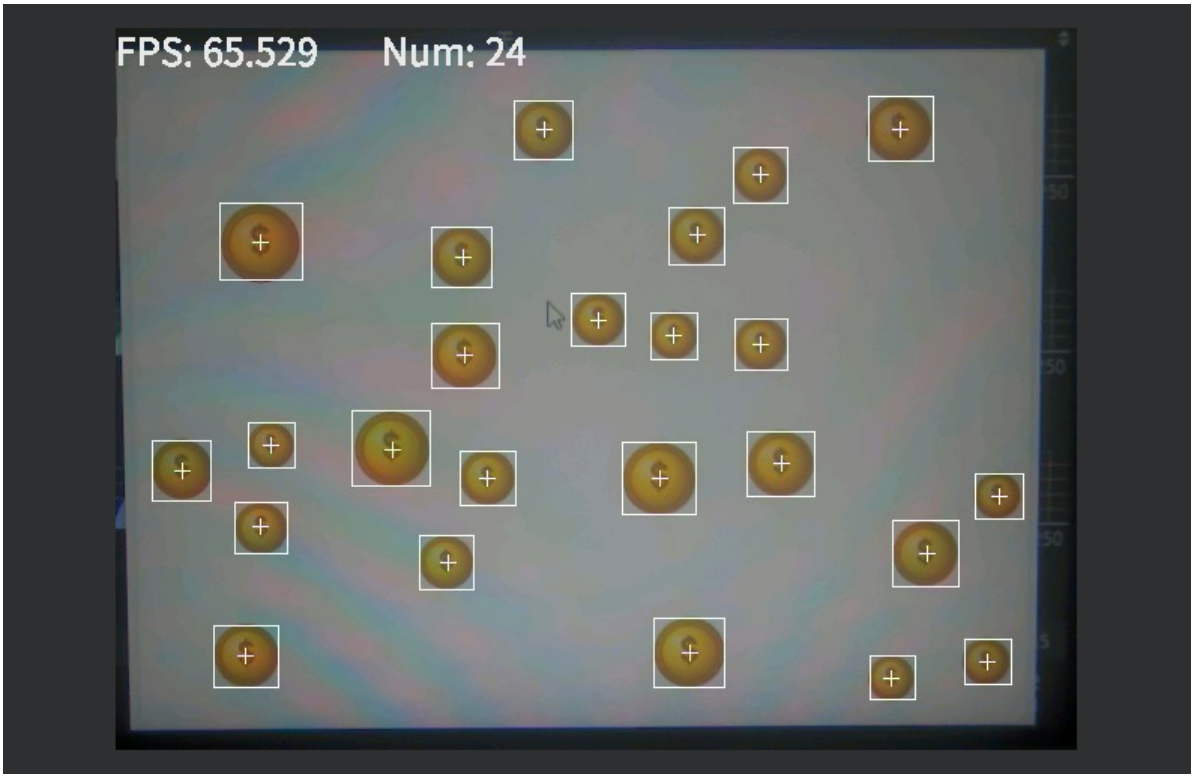
Here we use the [Generate Random Number of Coins] tool in the supporting materials to generate a random number of gold coin images



Generate a picture like the following:



Then we run the example code in this section and point the camera at this picture. You can see how many gold coins are recognized in the upper left corner of the screen.



We can generate a few more pictures to test, and we can see that the recognition speed is still very fast and the accuracy is relatively high.

Code Explanation

The example code file of this section is located in [Source Code/05.Color/02.item_count.py]

Complete code

```
import time
import os
import sys
from media.sensor import Sensor
from media.display import Display
from media.media import MediaManager

# 常量定义 / Constants definition
SCREEN_WIDTH = 640
SCREEN_HEIGHT = 480
# 待检测物体的LAB色彩空间阈值 / LAB color space thresholds
# 这里写的阈值是配套工具中【金币生成器】生成的金币的颜色 / The threshold written here is
the color of the gold coins generated by the [Generate Random Number of Coins] in
the supporting tool
# Format: (L_min, L_max, A_min, A_max, B_min, B_max)
TRACK_THRESHOLD = [(0, 100, -7, 127, 10, 83)]
# 文字显示参数 / Text display parameters
FONT_SIZE = 25
TEXT_COLOR = (233, 233, 233)  # 白色 / White

def init_camera():
    """
    初始化并配置摄像头
    Initialize and configure the camera
    """
    # sensor = Sensor(width=1280,height=960)
    sensor = Sensor()
    sensor.reset()
    sensor.set_framesize(width=SCREEN_WIDTH, height=SCREEN_HEIGHT)
    sensor.set_pixformat(Sensor.RGB565)
    return sensor

def init_display():
    """
    初始化显示设备
    Initialize display device
    """
    # 初始化3.5寸MIPI屏幕和IDE显示
    # Initialize 3.5-inch MIPI screen and IDE display

 Display.init(Display.ST7701,width=SCREEN_WIDTH,height=SCREEN_HEIGHT,to_ide=True
)
    MediaManager.init()

def process_frame(img, threshold):
    """
    处理单帧图像，检测并标记目标物体
    Process single frame, detect and mark target objects
```

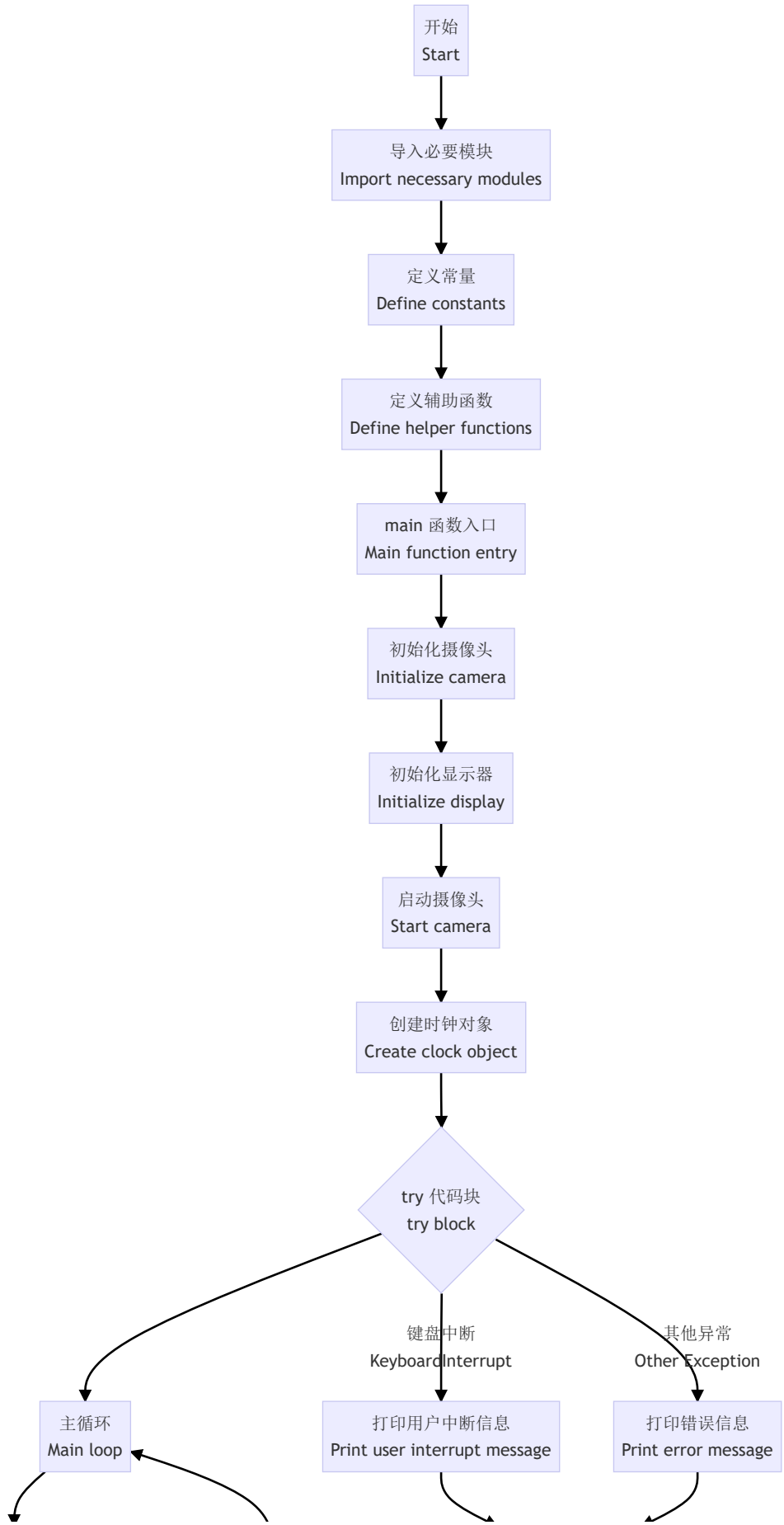
```
    Args:
        img: 输入图像 / Input image
        threshold: 颜色阈值 / Color threshold

    Returns:
        blobs: 检测到的物体列表 / List of detected objects
    """
    blobs = img.find_blobs([threshold])

    if blobs:
        for blob in blobs:
            # 绘制矩形框和中心十字 / Draw rectangle and center cross
            img.draw_rectangle(blob[0:4])
            img.draw_cross(blob[5], blob[6])

    return blobs

def draw_info(img, fps, num_objects):
    """
    在图像上绘制信息
    Draw information on image

    Args:
        img: 输入图像 / Input image
        fps: 帧率 / Frames per second
        num_objects: 检测到的物体数量 / Number of detected objects
    """
    info_text = f'FPS: {fps:.3f}       Num: {num_objects}'
    img.draw_string_advanced(0, 0, FONT_SIZE, info_text, color=TEXT_COLOR)

def main():
    """
    主程序入口
    Main program entry
    """
    # 初始化设备 / Initialize devices
    sensor = init_camera()
    init_display()
    sensor.run()

    # 创建时钟对象用于FPS计算 / Create clock object for FPS calculation
    clock = time.clock()

    try:
        while True:
            clock.tick()

            # 捕获图像 / Capture image
            img = sensor.snapshot()

            # 处理图像 / Process image
            blobs = process_frame(img, TRACK_THRESHOLD[0])

            # 显示信息 / Display information
            draw_info(img, clock.fps(), len(blobs))

            # 显示图像 / Show image
```

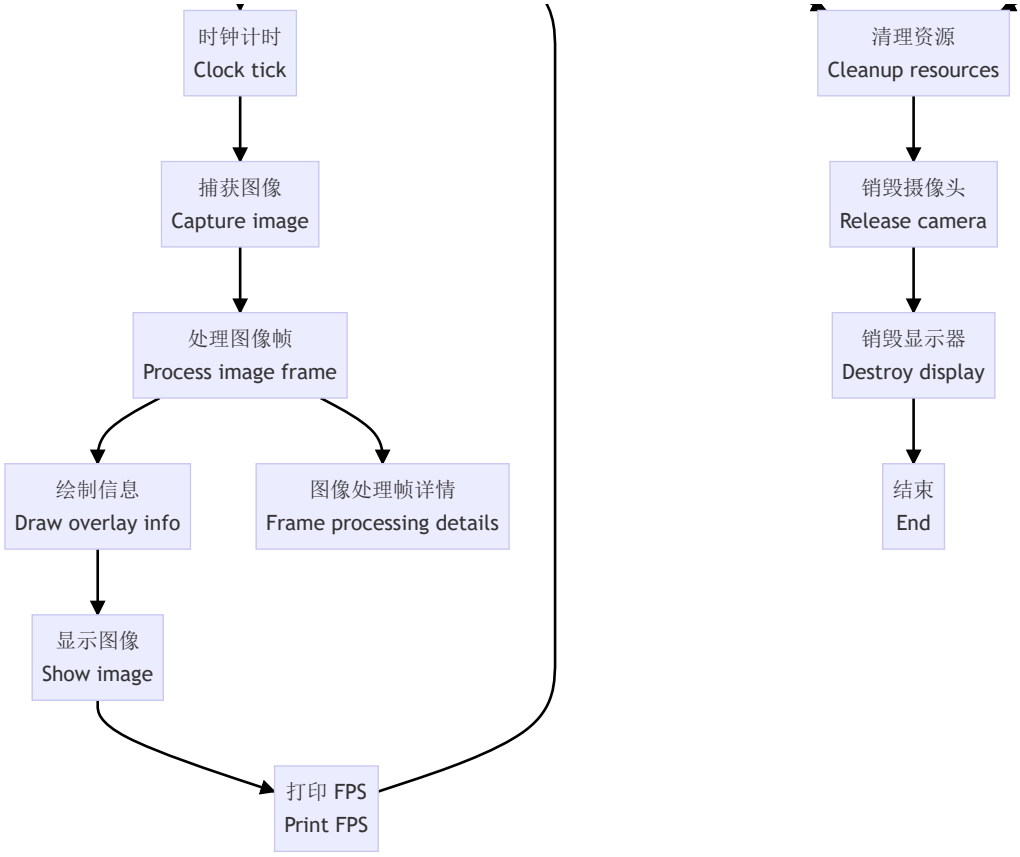
```
            Display.show_image(img)

            # 打印FPS / Print FPS
            print(f"FPS: {clock.fps():.3f}")

    except KeyboardInterrupt:
        print("Program terminated by user")
    except Exception as e:
        print(f"Error occurred: {str(e)}")
    finally:
        # 清理资源 / Cleanup resources
        sensor.deinit()
        Display.deinit()

if __name__ == "__main__":
    main()
```

Code structure

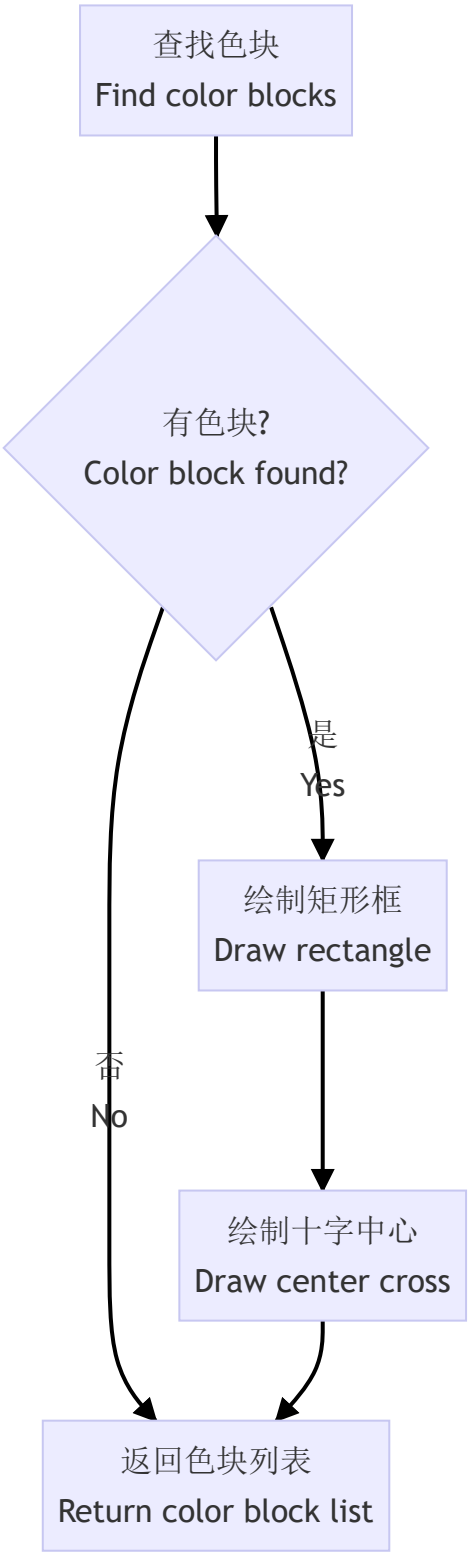
1. Initialization phase:
    - Import necessary modules
    - Define constants (screen size, color thresholds, etc.)
    - Defining Helper Functions
    - Initialize the camera and display
    - Create a clock object
2. In the main loop:
    - Clock timing
    - Capturing image frames
    - Process the image (find color patches, draw markers)
    - Display information and images
    - Print FPS
3. Exception handling:
    - Handling keyboard interrupts
    - Handling other exceptions
4. Cleaning:
    - Destroy the camera
    - Destroy the display

The detailed process is shown in the figure:


开始
Start
导入必要模块
Import necessary modules
定义常量
Define constants
定义辅助函数
Define helper functions
main 函数入口
Main function entry
初始化摄像头
Initialize camera
初始化显示器
Initialize display
启动摄像头
Start camera
创建时钟对象
Create clock object
try 代码块
try block
键盘中断
KeyboardInterrupt
其他异常
Other Exception
主循环
Main loop
打印用户中断信息
Print user interrupt message
打印错误信息
Print error message


时钟计时
Clock tick
捕获图像
Capture image
处理图像帧
Process image frame
绘制信息
Draw overlay info
图像处理帧详情
Frame processing details
显示图像
Show image
打印 FPS
Print FPS
清理资源
Cleanup resources
销毁摄像头
Release camera
销毁显示器
Destroy display
结束
End

图像处理帧详情：



Frequently asked questions

Why is my recognition result not good?

Due to differences in lighting, camera parameters, and screen parameters, the threshold in the routine code may not be the most appropriate. We can use the camera routine code used in the previous tutorial to take pictures of the objects we want to recognize in real scenes. Then refer to the process of customizing colors in the previous color recognition tutorial to extract a more appropriate color threshold.