Palm key point detection

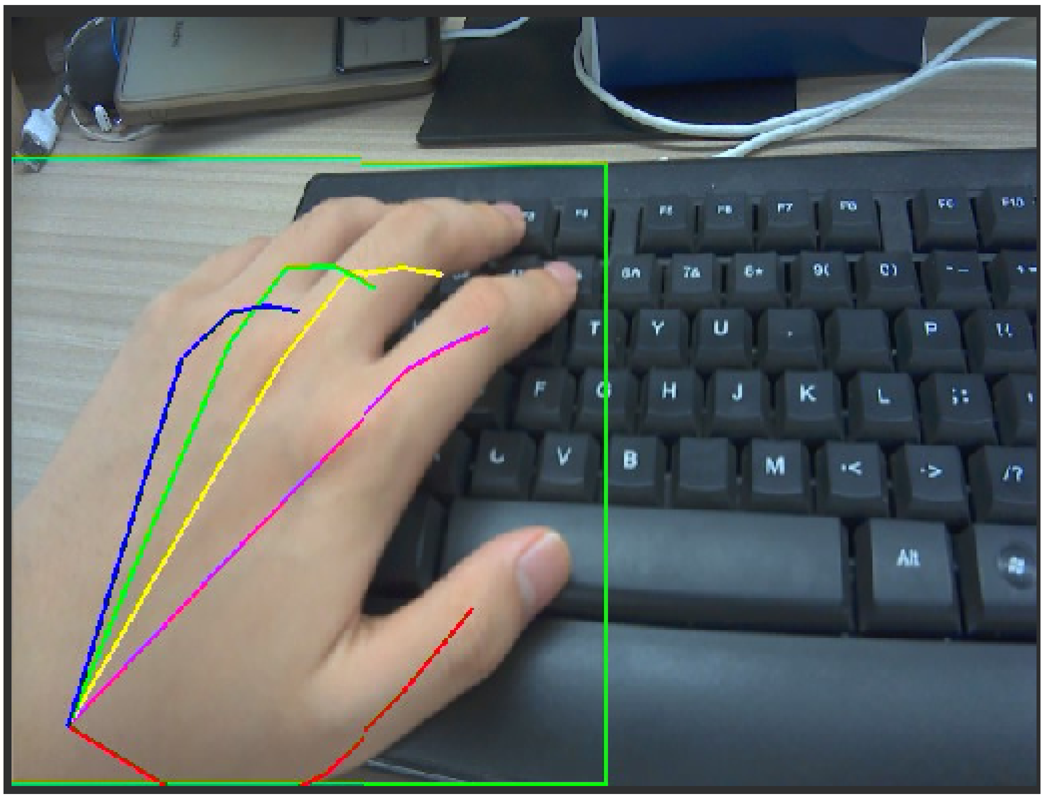
Routine Experiment Effect

In this section, we will learn how to use K230 to detect the key points of the human palm.

The example code is in [Source code/08.Body/06.hand_keypoint_detection.py]

After connecting to the IDE, run the sample code in this section and use K230 to aim at a picture of a human hand. You can see that the key points of the hand are marked with lines of different colors on the screen.

> Since the model is relatively complex and the loading process takes a long time, there is only a picture in the first few seconds of running, but no recognition. This is normal.



Code Explanation

Code structure

System Initialization:

- Parameter initialization
- Create pipeline
- Initialize detector

Hand Detection Process:

- Image preprocessing
- Hand detection
- Detection box filtering

Keypoint Detection Process:

- Hand region cropping
- Keypoint detection
- Coordinate processing

Visualization:

- Draw detection box
- Draw keypoints
- Draw connections

Error Handling:

- Exception catching
- Resource cleanup
- Program exit

Code Explanation

For the complete code, please refer to the file [Source Code/08.Body/05.hand_keypoint_detection.py]

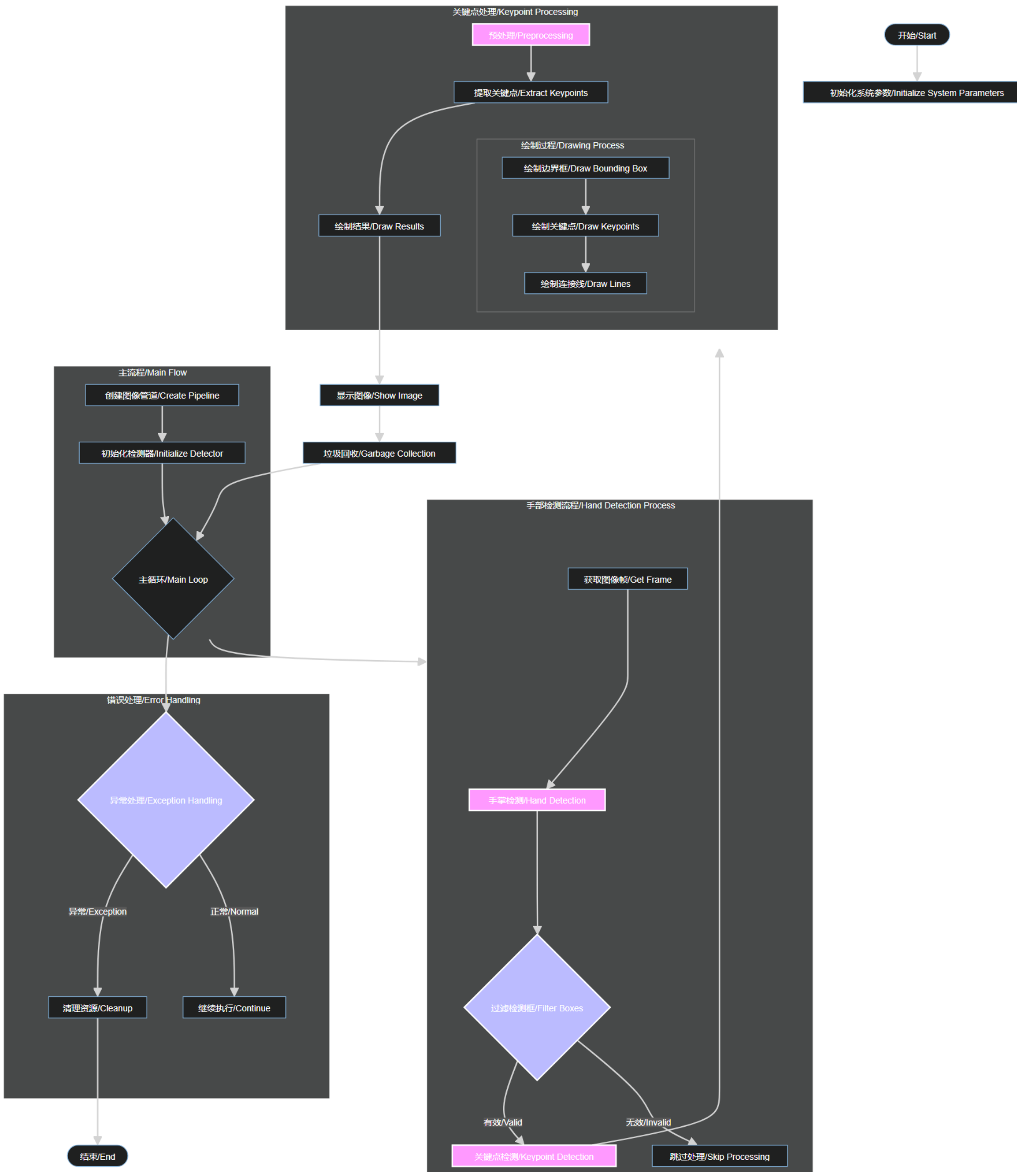
```
if __name__ == "__main__":
    # 显示模式，默认"hdmi",可以选择"hdmi"和"lcd" / Display mode, default is "hdmi", can be "hdmi" or "lcd"
    display_mode = "lcd"
    rgb888p_size = [640, 360]

    # 根据显示模式设置显示尺寸 / Set display size based on display mode
    if display_mode == "hdmi":
        display_size = [1920, 1080]
    else:
        display_size = [640, 480]
    # 手掌检测模型路径 / Path to hand detection model
    hand_det_kmodel_path = "/sdcard/kmodel/hand_det.kmodel"
    # 手部关键点模型路径 / Path to hand keypoint model
    hand_kp_kmodel_path = "/sdcard/kmodel/handkp_det.kmodel"
    # 其它参数 / Other parameters
    anchors_path = "/sdcard/utils/prior_data_320.bin"
    hand_det_input_size = [512, 512]
    hand_kp_input_size = [256, 256]
    confidence_threshold = 0.2
    nms_threshold = 0.5
    labels = ["hand"]
    anchors = [26, 27, 53, 52, 75, 71, 80, 99, 106, 82, 99, 134, 140, 113, 161,
172, 245, 276]

    # 初始化PipeLine，只关注传给AI的图像分辨率，显示的分辨率
    # Initialize PipeLine, focusing only on the image resolution passed to AI and
the display resolution
    pl = PipeLine(rgb888p_size=rgb888p_size, display_size=display_size,
display_mode=display_mode)
    pl.create()
    # 初始化手掌关键点检测任务 / Initialize hand keypoint detection task
    hkd = HandKeyPointDet(hand_det_kmodel_path, hand_kp_kmodel_path,
det_input_size=hand_det_input_size, kp_input_size=hand_kp_input_size,
labels=labels, anchors=anchors, confidence_threshold=confidence_threshold,
nms_threshold=nms_threshold, nms_option=False, strides=[8, 16, 32],
rgb888p_size=rgb888p_size, display_size=display_size)

    # 主循环 / Main loop
    while True:
        with ScopedTiming("total", 1):
            img = pl.get_frame()                        # 获取当前帧 / Get current
frame
            det_boxes, hand_res = hkd.run(img)          # 推理当前帧 / Process
current frame
            hkd.draw_result(pl, det_boxes, hand_res)    # 绘制推理结果 / Draw
inference results
            pl.show_image()                             # 展示推理结果 / Show
inference results
            gc.collect()                                # 执行垃圾回收 / Perform
garbage collection
            time.sleep_ms(5)                            # 短暂休眠减少CPU占用 /
Brief sleep to reduce CPU usage
    pl.destroy()
    hkd.hand_det.deinit()
    hkd.hand_kp.deinit()
```

flow chart


开始/Start
初始化系统参数/Initialize System Parameters
关键点处理/Keypoint Processing
预处理/Preprocessing
提取关键点/Extract Keypoints
绘制过程/Drawing Process
绘制边界框/Draw Bounding Box
绘制关键点/Draw Keypoints
绘制连接线/Draw Lines
绘制结果/Draw Results
显示图像/Show Image
垃圾回收/Garbage Collection
主流程/Main Flow
创建图像管道/Create Pipeline
初始化检测器/Initialize Detector
主循环/Main Loop
手部检测流程/Hand Detection Process
获取图像帧/Get Frame
手掌检测/Hand Detection
过滤检测框/Filter Boxes
有效/Valid
无效/Invalid
关键点检测/Keypoint Detection
跳过处理/Skip Processing
错误处理/Error Handling
异常处理/Exception Handling
异常/Exception
正常/Normal
清理资源/Cleanup
继续执行/Continue
结束/End