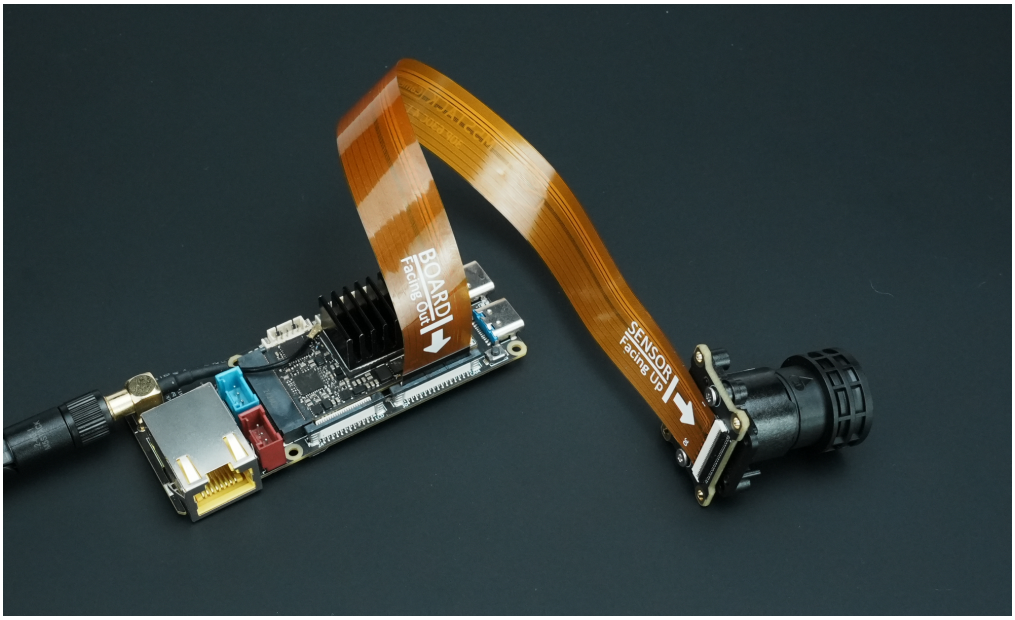
LLM630 Compute Kit - StackFlow API Yolo11n Demo

This demo shows how to run a script on the LLM630 Compute Kit to obtain YOLO detection results via the StackFlow API and print them to the terminal.

1. Preparation

1. Before powering on the device, connect the CamModule SC850SL camera to the LLM630 Compute Kit using an FPC cable as shown below:



2. Refer to the LLM630 Compute Kit UART / ADB / SSH Debugging Guide to learn how to configure the network and file transfer, and obtain the device’ s IP address.
3. Refer to the LLM630 Compute Kit Software Update Guide to install the following software and model packages:

```
apt install llm-camera llm-yolo # SoftWare Package
```

> **Note**
>
> The CSI camera uses AI-ISP, which provides excellent image quality in low-light environments but uses half of the NPU performance. The default YOLO models cannot run when AI-ISP is enabled. Use the command below to install YOLO models compatible with AI-ISP:

```
apt install llm-model-yolo11n-npu1 llm-model-yolo11n-pose-npu1 llm-model-yolo11n-hand-pose-npu1 # Model
```

2. Client Script

Download the client test script and ensure that your PC is on the same network as the LLM630 Compute Kit. Copy and save the script below. If running from your PC, provide the actual IP address of the LLM630 Compute Kit:

```
python llm-yolo.py --host 192.168.20.24
```

If you run the script directly on the device, upload the file to the LLM630 Compute Kit and run it without providing the `--host` parameter:

```
adb push llm-yolo.py /root
```

```
adb shell
```

```
cd /root
python3 llm-yolo.py
```

```
import argparse
import json
import select
import socket
import sys
import time
import platform

if platform.system() == "Windows":
    import msvcrt


def create_tcp_connection(host, port):
    sock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    sock.connect((host, port))
    return sock


def send_json(sock, data):
    json_data = json.dumps(data, ensure_ascii=False) + '\n'
    sock.sendall(json_data.encode('utf-8'))


recv_buffer = ""

def receive_response(sock):
    global recv_buffer
    while '\n' not in recv_buffer:
        part = sock.recv(4096).decode('utf-8')
        if not part:
            break
        recv_buffer += part
    if '\n' in recv_buffer:
        line, recv_buffer = recv_buffer.split('\n', 1)
        return line.strip()
    else:
        line, recv_buffer = recv_buffer, ""
        return line.strip()

def close_connection(sock):
    if sock:
        sock.close()


def create_init_data(response_format, device, enoutput, frame_height, frame_width, enable_webstream, rt
    return {
        "request_id": "camera_001",
        "work_id": "camera",
        "action": "setup",
        "object": "camera.setup",
        "data": {
            "response_format": "image.yuvraw.base64" if response_format =="yuv" else "image.jpeg.base64
            "input": device,
```

```
            "enoutput": enoutput,
            "frame_width": frame_width,
            "frame_height": frame_height,
            "enable_webstream": enable_webstream,
            "rtsp": "rtsp.1280x720.h265" if rtsp == "h265" else "rtsp.1280x720.h264",
        }
    }


def parse_setup_response(response_data):
    error = response_data.get('error')
    if error and error.get('code') != 0:
        print(f"Error Code: {error['code']}, Message: {error['message']}")
        return None

    return response_data.get('work_id')


def reset(sock):
    sent_request_id = 'reset_000'
    reset_data = {
        "request_id": sent_request_id,
        "work_id": "sys",
        "action": "reset"
    }
    ping_data = {
        "request_id": "ping_000",
        "work_id": "sys",
        "action": "ping"
    }
    send_json(sock, reset_data)
    while True:
        try:
            send_json(sock, ping_data)
            time.sleep(1)
        except (BrokenPipeError, ConnectionResetError, OSError) as e:
            return # Sock disconnection indicates reset is complete


def setup(sock, init_data):
    sent_request_id = init_data['request_id']
    send_json(sock, init_data)
    while True:
        response = receive_response(sock)
        response_data = json.loads(response)
        if response_data.get('request_id') == sent_request_id:
            return parse_setup_response(response_data)


def exit_session(sock, deinit_data):
    send_json(sock, deinit_data)
    print("Exit")
```

```python
def parse_inference_response(response_data):
    error = response_data.get('error')
    if error and error.get('code') != 0:
        print(f"Error Code: {error['code']}, Message: {error['message']}")
        return None

    return {
        "work_id": response_data.get("work_id"),
        "object": response_data.get("object"),
        "data": response_data.get("data")
    }


def parse_yolo_result(data):
    results = []
    for item in data:
        bbox = [float(x) for x in item.get('bbox', [])]
        kps = [float(x) for x in item.get('kps', [])]
        cls = item.get('class', '')
        conf = float(item.get('confidence', 0))
        results.append({
            'bbox': bbox,
            'class': cls,
            'confidence': conf,
            'kps': kps
        })
    return results


def main(args):
    sock = create_tcp_connection(args.host, args.port)

    frame_width, frame_height = args.imgsz

    try:
        print("Reset...")
        reset(sock)
        close_connection(sock)
        sock = create_tcp_connection(args.host, args.port)

        print("Setup Camera...")
        init_data = create_init_data(
            response_format = args.format,
            enoutput=args.enoutput,
            device=args.device,
            frame_height=frame_height,
            frame_width=frame_width,
            enable_webstream=args.webstream,
            rtsp=args.rtsp
        )
        camera_work_id = setup(sock, init_data)
        if camera_work_id is not None:
```

```
        print(f"Camera setup with work_id: {camera_work_id}")
    else:
        print("Camera setup failed.")
        return

    print("Setup Yolo...")
    yolo_init_data = {
        "request_id": "yolo_001",
        "work_id": "yolo",
        "action": "setup",
        "object": "yolo.setup",
        "data": {
            "model": args.model,
            "response_format": "yolo.box",
            "input":  camera_work_id,
            "enoutput": True,
        }
    }
    yolo_work_id = setup(sock, yolo_init_data)
    if yolo_work_id is not None:
        print(f"Yolo setup with work_id: {yolo_work_id}")
    else:
        print("Yolo setup failed.")
        return

    while True:
        if platform.system() == "Windows":
            if msvcrt.kbhit():
                key = msvcrt.getwch()
                if key == 'q':
                    print("Quit by user.")
                    break
        else:
            if sys.stdin in select.select([sys.stdin], [], [], 0)[0]:
                key = sys.stdin.readline().strip()
                if key == 'q':
                    print("Quit by user.")
                    break

        response = receive_response(sock)
        if not response:
            continue
        response_data = json.loads(response)

        Rawdata = parse_inference_response(response_data)
        if Rawdata is None:
            break

        work_id = Rawdata.get("work_id")
        object = Rawdata.get("object")
        data = Rawdata.get("data")

        if work_id == yolo_work_id and object == "yolo.box":
```

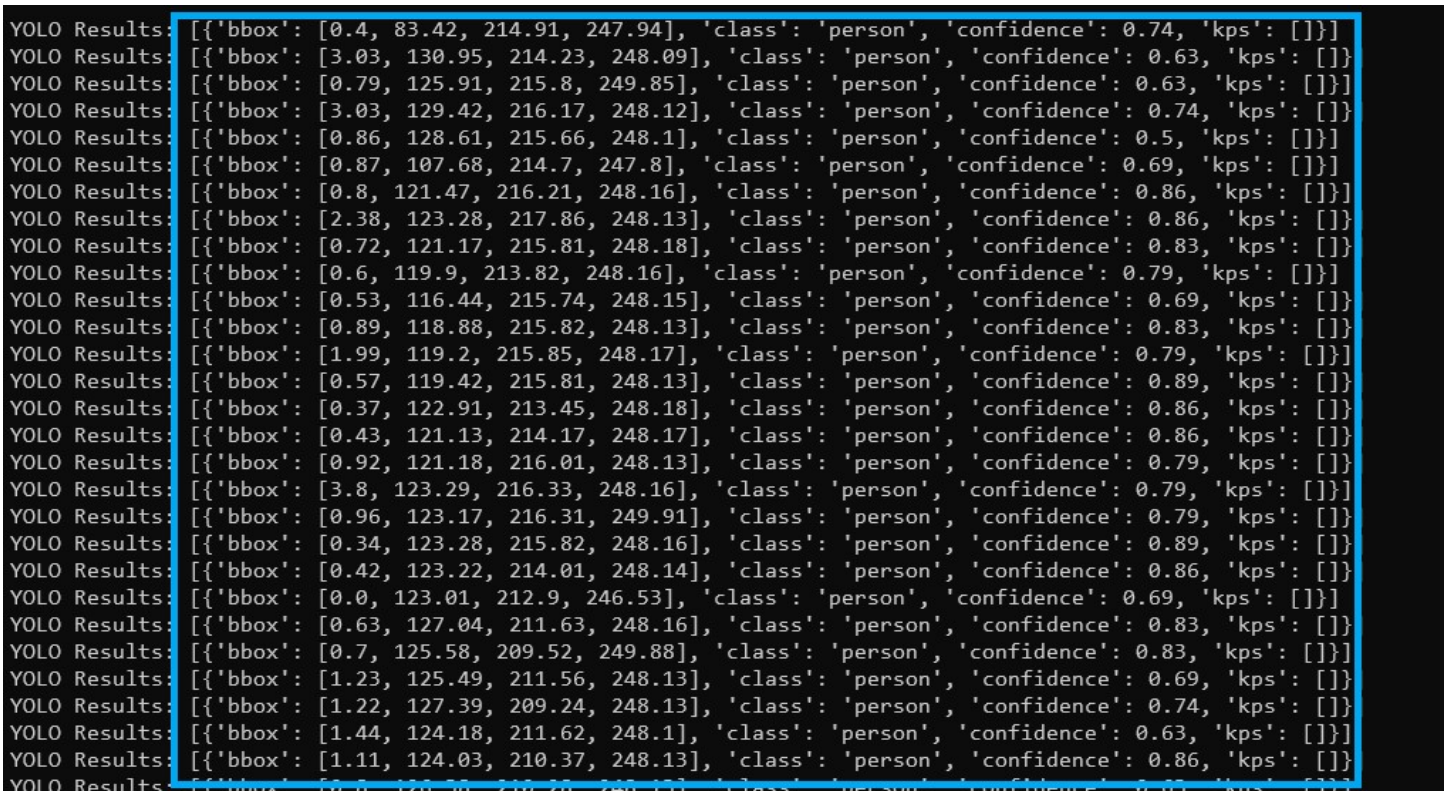
```
                yolo_results = parse_yolo_result(data)
                print(f"YOLO Results: {yolo_results}")

        exit_session(sock, {
            "request_id": "yolo_exit",
            "work_id": yolo_work_id,
            "action": "exit"
        })
        exit_session(sock, {
            "request_id": "camera_exit",
            "work_id": camera_work_id,
            "action": "exit"
        })
        time.sleep(3) # Allow time for the exit command to be processed
    finally:
        close_connection(sock)


if __name__ == "__main__":
    parser = argparse.ArgumentParser(description="TCP Client to send JSON data.")
    parser.add_argument("--host", type=str, default="localhost", help="Server hostname (default: localh
    parser.add_argument("--port", type=int, default=10001, help="Server port (default: 10001)")
    parser.add_argument("--device", type=str, default="axera_single_sc850sl", help="Camera name, i.e. a
    parser.add_argument("--enoutput", type=bool, default=False, help="Whether to output image data")
    parser.add_argument("--format", "--output-format", type=str, default="yuv", help="Output image data
    parser.add_argument("--imgsz", "--img", "--img-size", nargs="+", type=int, default=[320, 320], help
    parser.add_argument("--webstream", action="store_true", help="Enable webstream")
    parser.add_argument("--rtsp", default="h264", help="rtsp output, i.e. h264 or h265")
    parser.add_argument("--model", type=str, default="yolo11n-npu1", help="Model name, i.e. yolo11n-npu


    args = parser.parse_args()
    main(args)
```

Parameter Description

- **host**: IP address of the LLM630 Compute Kit
- **port**: TCP communication port (default: 10001)
- **device**: Camera name; for MIPI CSI, use `'axera_single_sc850sl'`. For USB video cameras, specify like `'/dev/video0'`
- **enoutput**: Whether to output image data (default: False)
- **format**: Output image format (default: `'yuv'`; options: `'jpeg'`)
- **imgsz**: Output image resolution (default: `320x320`)
- **webstream**: Enable web streaming (default: off). If enabled, visit `http://IP:8989/` in a browser (replace IP with your device's IP)
- **rtsp**: RTSP stream format (`h264` or `h265`)
- **model**: YOLO model to load. Default is `'yolo11n-npu1'`. Other options: `'yolo11n-pose-npu1'`, `'yolo11n-hand-pose-npu1'`

3. Start Interaction

The terminal will print YOLO detection results.


YOLO Results: [{'bbox': [0.4, 83.42, 214.91, 247.94], 'class': 'person', 'confidence': 0.74, 'kps': []}]
YOLO Results: [{'bbox': [3.03, 130.95, 214.23, 248.09], 'class': 'person', 'confidence': 0.63, 'kps': []}
YOLO Results: [{'bbox': [0.79, 125.91, 215.8, 249.85], 'class': 'person', 'confidence': 0.63, 'kps': []}]
YOLO Results: [{'bbox': [3.03, 129.42, 216.17, 248.12], 'class': 'person', 'confidence': 0.74, 'kps': []}
YOLO Results: [{'bbox': [0.86, 128.61, 215.66, 248.1], 'class': 'person', 'confidence': 0.5, 'kps': []}]
YOLO Results: [{'bbox': [0.87, 107.68, 214.7, 247.8], 'class': 'person', 'confidence': 0.69, 'kps': []}]
YOLO Results: [{'bbox': [0.8, 121.47, 216.21, 248.16], 'class': 'person', 'confidence': 0.86, 'kps': []}]
YOLO Results: [{'bbox': [2.38, 123.28, 217.86, 248.13], 'class': 'person', 'confidence': 0.86, 'kps': []}
YOLO Results: [{'bbox': [0.72, 121.17, 215.81, 248.18], 'class': 'person', 'confidence': 0.83, 'kps': []}
YOLO Results: [{'bbox': [0.6, 119.9, 213.82, 248.16], 'class': 'person', 'confidence': 0.79, 'kps': []}]
YOLO Results: [{'bbox': [0.53, 116.44, 215.74, 248.15], 'class': 'person', 'confidence': 0.69, 'kps': []}
YOLO Results: [{'bbox': [0.89, 118.88, 215.82, 248.13], 'class': 'person', 'confidence': 0.83, 'kps': []}
YOLO Results: [{'bbox': [1.99, 119.2, 215.85, 248.17], 'class': 'person', 'confidence': 0.79, 'kps': []}]
YOLO Results: [{'bbox': [0.57, 119.42, 215.81, 248.13], 'class': 'person', 'confidence': 0.89, 'kps': []}
YOLO Results: [{'bbox': [0.37, 122.91, 213.45, 248.18], 'class': 'person', 'confidence': 0.86, 'kps': []}
YOLO Results: [{'bbox': [0.43, 121.13, 214.17, 248.17], 'class': 'person', 'confidence': 0.86, 'kps': []}
YOLO Results: [{'bbox': [0.92, 121.18, 216.01, 248.13], 'class': 'person', 'confidence': 0.79, 'kps': []}
YOLO Results: [{'bbox': [3.8, 123.29, 216.33, 248.16], 'class': 'person', 'confidence': 0.79, 'kps': []}]
YOLO Results: [{'bbox': [0.96, 123.17, 216.31, 249.91], 'class': 'person', 'confidence': 0.79, 'kps': []}
YOLO Results: [{'bbox': [0.34, 123.28, 215.82, 248.16], 'class': 'person', 'confidence': 0.89, 'kps': []}
YOLO Results: [{'bbox': [0.42, 123.22, 214.01, 248.14], 'class': 'person', 'confidence': 0.86, 'kps': []}
YOLO Results: [{'bbox': [0.0, 123.01, 212.9, 246.53], 'class': 'person', 'confidence': 0.69, 'kps': []}]
YOLO Results: [{'bbox': [0.63, 127.04, 211.63, 248.16], 'class': 'person', 'confidence': 0.83, 'kps': []}
YOLO Results: [{'bbox': [0.7, 125.58, 209.52, 249.88], 'class': 'person', 'confidence': 0.83, 'kps': []}]
YOLO Results: [{'bbox': [1.23, 125.49, 211.56, 248.13], 'class': 'person', 'confidence': 0.69, 'kps': []}
YOLO Results: [{'bbox': [1.22, 127.39, 209.24, 248.13], 'class': 'person', 'confidence': 0.74, 'kps': []}
YOLO Results: [{'bbox': [1.44, 124.18, 211.62, 248.1], 'class': 'person', 'confidence': 0.63, 'kps': []}]
YOLO Results: [{'bbox': [1.11, 124.03, 210.37, 248.13], 'class': 'person', 'confidence': 0.86, 'kps': []}