5. Face detection

Note: In this case, the AI camera does not have computing power bonus and is called as a normal camera!

File path: /home/pi/AI_Camera/face_detaction-CSI.ipynb

The test code is as follows:

```
import enum
import cv2
def bgr8_to_jpeg(value, quality=75):
    return bytes(cv2.imencode('.jpg', value)[1])
```

```
import cv2
import ipywidgets.widgets as widgets
import threading
import time
import sys
import libcamera
from picamera2 import Picamera2
```

```
import inspect
import ctypes
def _async_raise(tid, exctype):
    """raises the exception, performs cleanup if needed"""
    tid = ctypes.c_long(tid)
    if not inspect.isclass(exctype):
        exctype = type(exctype)
    res = ctypes.pythonapi.PyThreadState_SetAsyncExc(tid,
ctypes.py_object(exctype))
    if res == 0:
        raise ValueError("invalid thread id")
    elif res != 1:
        # """if it returns a number greater than one, you're in trouble,
        # and you should call it again with exc=NULL to revert the effect"""
        ctypes.pythonapi.PyThreadState_SetAsyncExc(tid, None)
def stop_thread(thread):
    _async_raise(thread.ident, SystemExit)
```

```
# body_haar = cv2.CascadeClassifier("haarcascade_upperbody.xml")
face_haar = cv2.CascadeClassifier("haarcascade_frontalface_default.xml")
eye_haar = cv2.CascadeClassifier("haarcascade_eye_tree_eyeglasses.xml")
def Camera_display():
    while 1:
        frame = picam2.capture_array()
        gray_img = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
        faces = face_haar.detectMultiScale(gray_img, 1.1, 3)
        for face_x,face_y,face_w,face_h in faces:
            cv2.rectangle(frame, (face_x, face_y), (face_x+face_w,
face_y+face_h), (0,255,0), 2)
        eyes = eye_haar.detectMultiScale(gray_img, 1.1, 3)
```

```
        for eye_x,eye_y,eye_w,eye_h in eyes:
            cv2.rectangle(frame, (eye_x,eye_y), (eye_x+eye_w, eye_y+eye_h),
(255,0,0), 2)
        image_widget.value = bgr8_to_jpeg(frame)
        time.sleep(0.010)
```

```
image_widget = widgets.Image(format='jpeg', width=320, height=240)
display(image_widget)
```

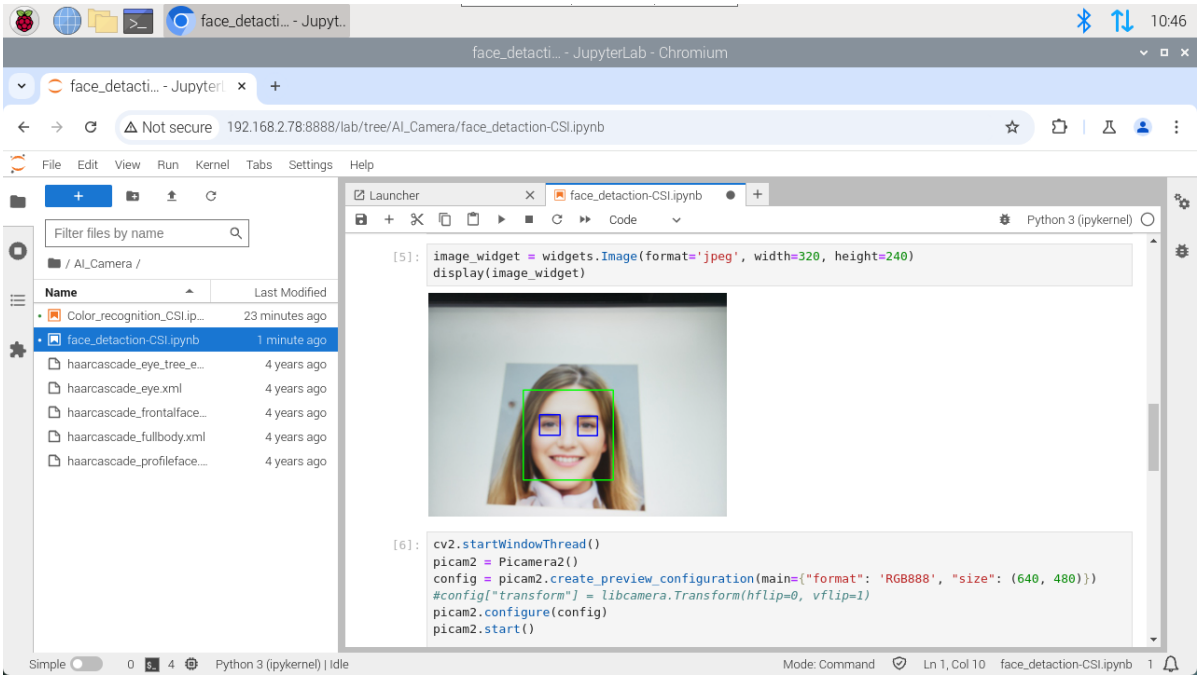
```
cv2.startWindowThread()
picam2 = Picamera2()
config = picam2.create_preview_configuration(main={"format": 'RGB888', "size":
(640, 480)})
#config["transform"] = libcamera.Transform(hflip=0, vflip=1)
picam2.configure(config)
picam2.start()

frame = picam2.capture_array()
image_widget.value = bgr8_to_jpeg(frame)
```

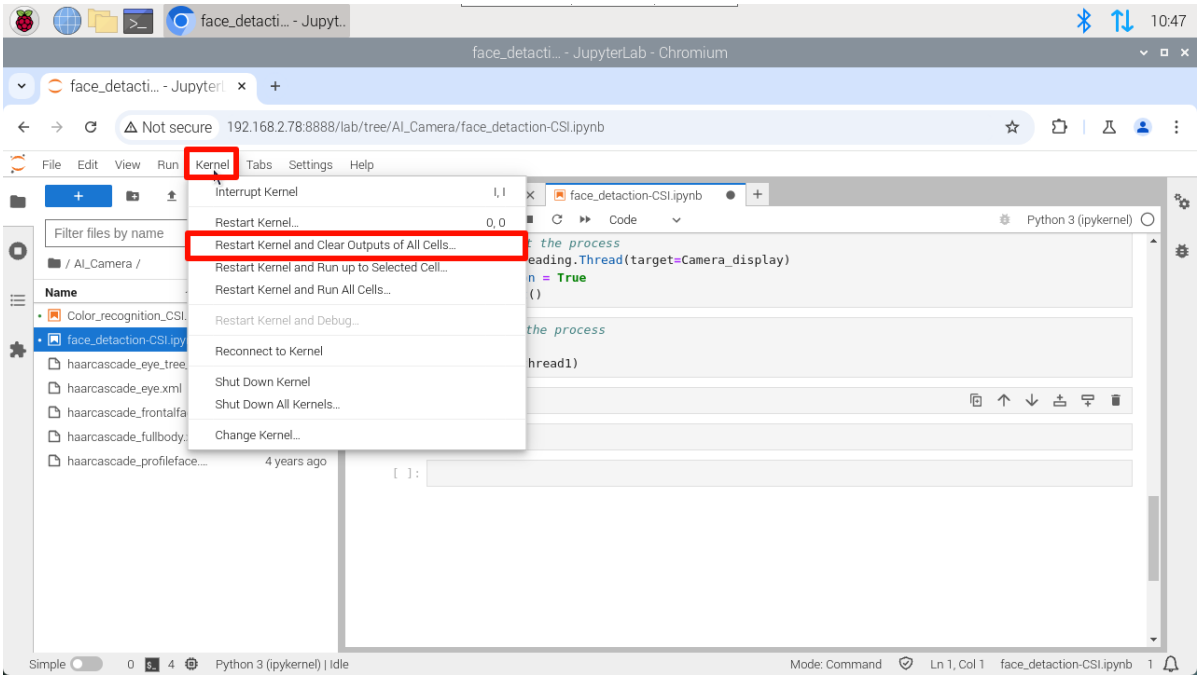
```
# Start the process
thread1 = threading.Thread(target=Camera_display)
thread1.daemon = True
thread1.start()
```

```
# End the process
picam2.stop()
stop_thread(thread1)
```

After running, we can see the camera display below the display camera component and frame the face and eyes of the person. Note that the light may affect the experimental results.



Note: For CSI cameras, if you want to rerun the program, you need to do the following:


face_detacti... - Jupyt..
10:47
face_detacti... - JupyterLab - Chromium
face_detacti... - Jupyter
Not secure
192.168.2.78:8888/lab/tree/AI_Camera/face_detaction-CSI.ipynb
File Edit View Run Kernel Tabs Settings Help
Interrupt Kernel I, I
Restart Kernel... 0, 0
Restart Kernel and Clear Outputs of All Cells...
Restart Kernel and Run up to Selected Cell...
Restart Kernel and Run All Cells...
Restart Kernel and Debug...
Reconnect to Kernel
Shut Down Kernel
Shut Down All Kernels...
Change Kernel...
Filter files by name
/ AI_Camera /
Name
Color_recognition_CSI...
face_detaction-CSI.ipy...
haarcascade_eye_tree...
haarcascade_eye.xml
haarcascade_frontalfa...
haarcascade_fullbody...
haarcascade_profileface....
4 years ago
face_detaction-CSI.ipynb
Code
Python 3 (ipykernel)
the process
eading.Thread(target=Camera_display)
n = True
()
the process
hread1)
[ ]:
Simple
Python 3 (ipykernel) | Idle
Mode: Command
Ln 1, Col 1
face_detaction-CSI.ipynb