Edge TPU DEV Board

软件环境

- python3.7
- edge TPU API version 2.11.1
- opencv4.5.2
- PIL

硬件环境

- Coral加速棒 - TPU
- RaspberryPi 4B - CPU
- Camera(处理录制好的视频可以不用)
- Mac/Linux操作系统
- 设备图

this code uses the edge TPU dev board, with software updates BEFORE sept 2019

- python3

- edge TPU API version 2.11.1

- board was flashed using Mendel Development Tool (MDT) version 1.3

- device name and IP: indigo-snail(192.168.100.2)

- check in python3 via:

- 介绍网站

- edgetpu API Docs

软件环境配置

测试设备

```
Editor:     Visual Studio Code 1.57.1
Dev Board:  RaspberryPi 4B 4G rev1.2
connect:    Remote-SSH
```

测试环境

```
Raspberry Pi 4B 4G
Debian Linux(和Ubuntu差不多)
python 3.7.3
pip3 21.1.2
```

版本验证

```
python3 -V
pip3 -V
```

更新和依赖安装

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install libhdf5-dev libhdf5-serial-dev
sudo apt-get install libqtgui4 libqtwebkit4 libqt4-test python3-pyqt5
sudo apt-get install libatlas-base-dev
sudo apt-get install libjasper-dev
python3 -m pip install --upgrade pip
python3 -m pip install numpy
```

安装opencv

```
python3 -m pip install opencv-python
python3 -m pip install opencv-contrib-python
```

安装PIL

```
python3 -m pip  install Pillow
```

安装edegtpu

```
wget https://dl.google.com/coral/edgetpu_api/edgetpu_api_2.11.1.tar.gz -O
edgetpu_api_2.11.1.tar.gz --trust-server-names
tar xzf edgetpu_api_2.11.1.tar.gz
cd edgetpu_api/
sudo bash ./install.sh
```

验证edgetpu版本

```
edgetpu.__version__
```

修复'_edgetpu_cpp_wrapper'

```
find /usr/local/ -name \*edgetpu\*
cd /usr/local/lib/python3.7/dist-packages/edgetpu/swig/
sudo ln -s _edgetpu_cpp_wrapper.cpython-35m-aarch64-linux-gnu.so
_edgetpu_cpp_wrapper.cpython-37m-aarch64-linux-gnu.so
```

安装验证

```
import edgetpu,cv2,PIL
edgetpu.__version__,cv2.__version__,PIL.__version__
>>>('2.11.1', '4.5.2', '8.2.0')
```

Code Structure

- 包括mAP计算程序、云服务器训练代码、标注、采样视频和图片、预测程序、预测结果输出文件、安装校验代码、以及一些工具(ffmpeg推流、segmentation图像分割、split视频帧截取等)。每个文件夹主要是py文件+sh运行脚本

DNN models/

- 预测模型，包括谷歌官方和开发者自己训练的

calculate_map/

- 用于计算mAp值，它用于衡量预测效果，范围0-1，值越高越好

labels/

- 标注信息，用于设置数据集，参与训练

object_detect_video/

- 核心预测程序，用于实时预测视频流或者预测已经录制好的视频并输出，包含预测程序py和执行程序脚本sh

raw_images/

- a few images to try the models on

sample_video/

- a short 5-10 sec video we captured to test the models on,用于object_detect_video中的预测程序

verify_setup/

- first try this code to see the TPU inferencing works well，执行里面的脚本文件开启自动识别并输出图片，从而验证软硬件环境是否配置完毕

split_video_into_images/

- extract a few images from a video，截取视频帧存为图片

Running Config

修复Win10中脚本sh文件空行BUG

```
sudo apt-get  install dos2unix
dos2unix dos2unix retrain_MN2_construction_waymo_run_inference.sh
dos2unix dos2unix *.sh
```

将项目路径添加至环境变量

```
export TPU_CODE_DIR=/home/pi/Work/edgetpu_dev_board_release
```

修改可执行脚本

```
位于TPU_CODE_DIR/object_dectect_video/retrain_MN2_construction_waymo_run_inference.sh
```

csv_run_inference.py参数解释

Syntax	Description	Deaufltvalue	Setvalue
--base-video-dir	目标视频路径		sample_video
--video_num	视频号/视频名称		extra_cut_1686
--output-video-dir	预测视频输出路径		output_video
--model_name	模型名称		
--model	.tflite文件	TPU模型	CPU模型
--labels	标注信息所在路径		labels
--maxobjects	每帧视频所检测的目标最大数量	3	7
--confidence	标注目标最小阈值	0.6	0.4
--ct	CPU/TPU	TPU	CPU
--print-mode	打印模式	True	True
--out-video-create-mode	是否保存预测后的视频	False	True
--csv_annotations	annotations输出路径		output_video
--use_webcam	Web在线查看	False	False
--write_frame_with_predictions_str	输出带有边框的视频	True	True
--max_video_duration_minutes_str		None	None

Running Code

Problem

- 目前还不知道如何修改csv_run_inference.py使其可以运行CPU模型

脚本命令执行

```
sh retrain_MN2_construction_waymo_run_inference.sh
```

python3语句执行

```
cd ~/Work/edgetpu_dev_board_release/object_detect_video
```

```
python3 csv_run_inference.py \
--base-video-dir ~/Work/edgetpu_dev_board_release/sample_video \
--video_num extra_cut_1686 \
--output-video-dir ~/Work/edgetpu_dev_board_release/output_images \
--model
~/Work/edgetpu_dev_board_release/DNN_models/harvestnet_retrained/final_paper_joint_waymo_co
nstruction_MN2_quantized.tflite \
--labels
~/Work/edgetpu_dev_board_release/labels/harvestnet_retrained/final_paper_joint_waymo_constr
uction_MN2_quantized_labels.txt \
--ct CPU \
--out-video-create-mode True \
--csv_annotations ~/Work/edgetpu_dev_board_release/output_images
```

```
cd ~/Work/edgetpu_dev_board_release/output_video
```

Result

```
args: {'base_video_dir': '/home/pi/Work/edgetpu_dev_board_release/sample_video',
'video_num': 'extra_cut_1686', 'output_video_dir':
'/home/pi/Work/edgetpu_dev_board_release/output_video/', 'model_name': 'retrained_MN2',
'model':
'/home/pi/Work/edgetpu_dev_board_release/DNN_models/harvestnet_retrained/final_paper_joint_
waymo_construction_MN2_quantized.tflite', 'labels':
'/home/pi/Work/edgetpu_dev_board_release/labels/harvestnet_retrained/final_paper_joint_waym
o_construction_MN2_quantized_labels.txt', 'maxobjects': 7, 'confidence': 0.4, 'ct': 'CPU',
'print_mode': 'False', 'out_video_create_mode': 'True', 'csv_annotations':
'/home/pi/Work/edgetpu_dev_board_release/output_video/', 'use_webcam': 'False',
'write_frame_with_predictions_str': 'True', 'max_video_duration_minutes_str': 'None'}
Traceback (most recent call last):
  File "csv_run_inference.py", line 113, in <module>
    inferenceEngine = edgetpu.detection.engine.BasicEngine(args['model'])
  File "/usr/local/lib/python3.7/dist-packages/edgetpu/basic/basic_engine.py", line 40, in
__init__
    self._engine = BasicEnginePythonWrapper.CreateFromFile(model_path)
RuntimeError: No Edge TPU device detected!
```