

Application Note



Xilinx Vitis AI 'facedetect' Demo on Trenc Electronic board TE0808 SoM + TEBF0808 Carrier

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1 Description

This document provides tutorial how to setup and run Vitis AI 2.0 demo “facedetect” on Trenz TE0808 SoM attached to TEBF0808 carrier board, result see Figure 1.



Figure 1: Example output from ‘facedetect’ demo

2 Requirements

1. Hardware:
 - a. Trenz TE0808 SoM installed on TEBF0808 and power source.
 - b. Display Port Cable.
 - c. Display port monitor with FHD support.
 - d. USB webcam with USB cable, tested with See3CAM_CU30 - 3.4 Mpix Low Light USB Camera (Color).
 - e. Ethernet UTP cable.
2. Software:
 - a. Finished “Test 3: Vitis-AI Demo” [1] example from TE0808 StarterKit Vitis AI Tutorial, i.e. it is possible to run `dpu_trd (resnet50)` demo.

3 How to Run

1. Use your PC to download image and video packages:

https://www.xilinx.com/bin/public/openDownload?filename=vitis_ai_library_r2.0.0_images.tar.gz
https://www.xilinx.com/bin/public/openDownload?filename=vitis_ai_library_r2.0.0_video.tar.gz

2. Extract them to place, where Vitis AI library is located (we do assume that library is cloned into `~/vitis_ai_2_0` folder as instructed in TE0808 StarterKit Vitis AI Tutorial). Files will be added to existing folder structure:

```
tar xvzf vitis_ai_library_r2.0.0_images.tar.gz -C ~/vitis_ai_2_0/demo/Vitis-AI-Library/  
tar xvzf vitis_ai_library_r2.0.0_video.tar.gz -C ~/vitis_ai_2_0/demo/Vitis-AI-Library/
```

3. Connect UTP and power cable to TE0808+TEBF0808. Power on the board.
4. Connect your PC to TE0808 using SFTP.
5. Copy whole folder using SFTP:

Folder to copy:

```
~/vitis_ai_2_0/demo/Vitis_AI_Library/samples/facedetect
```

Target on TE0808 board:

```
/home/root
```

6. Open ssh terminal to TE0808 board.
7. In terminal build 'facedetect' example:

```
cd /home/root/facedetect  
chmod +x ./build.sh  
./build.sh
```

NOTE: You can also cross-compile on PC. Use these steps instead of pt 7:

1. From Vitis-AI tutorial, sysroot is installed in:

```
~/work/te0808_24_240/StarterKit_pfm
```

2. Setup cross-compiler environment in terminal:

```
cd ~/work/te0808_24_240/StarterKit_pfm  
source ./environment-setup-cortexa72-cortexa53-xilinx-linux  
cd ~/vitis_ai_2_0/demo/Vitis-AI-Library/samples/facedetect  
./build.sh
```

3. Copy compilation results using SFTP to TE0808 `/home/root/facedetect` folder

8. Open readme file located at `/home/root/facedetect` and find names of required models to run this demo, in this case readme says the valid models are:

Valid model name:

```
densebox_320_320  
densebox_640_360
```

9. Go to PC and open folder `~/vitis_ai_2_0/models/AI-Model-Zoo/` and use one of following options to download model:
 - a. Use downloader.py in terminal to download models, run:

```
python3 downloader.py
```

when asked for input fill: "cf densebox", then enter "0" for all and enter "2" for zcu102 & zcu104 & kv260. Wait until models in form of tar.gz archives are downloaded.

- b. Find download links manually, in our case they are:

https://www.xilinx.com/bin/public/openDownload?filename=densebox_320_320-zcu102_zcu104_kv260-r2.0.0.tar.gz
https://www.xilinx.com/bin/public/openDownload?filename=densebox_640_360-zcu102_zcu104_kv260-r2.0.0.tar.gz

NOTE: the links can be found in ~/vitis_ai_2_0/models/AI-Model-Zoo/model-list subfolders containing model name:

```
cf_densebox_wider_320_320_0.49G_2.0  
cf_densebox_wider_360_640_1.11G_2.0
```

In both folders open model.yaml file and find download link where 'name' matches our valid model name from readme and 'board' matches 'zcu102 & zcu104 & kv260'.

10. Use SFTP from PC to TE0808 again and copy tar.gz archives from point 9 to /home/root/facedetect

11. In ssh terminal open to TE0808 unpack models:

```
tar xvzf densebox_320_320-zcu102_zcu104_kv260-r2.0.0.tar.gz  
tar xvzf densebox_640_360-zcu102_zcu104_kv260-r2.0.0.tar.gz
```

12. Test 'facedetect' example on TE0808 in file to file mode:

- a. In ssh terminal to TE0808 run:

```
cd /home/root/facedetect  
env XLNX_VART_FIRMWARE=/mnt/sd-mmcb1k1p1/dpu.xclbin \  
./test_jpeg_facedetect densebox_320_320 sample_facedetect.jpg
```

13. See result in file: 0_sample_facedetect_result.jpg at the same directory.

14. Test 'facedetect' example on TE0808 using USB webcam:

- a. Connect screen using Display Port.
b. Check if linux desktop manager can be seen on screen, if not, reboot the board.
c. Connect USB webcam.
d. Run application:

```
env DISPLAY=:0.0 XLNX_VART_FIRMWARE=/mnt/sd-mmcb1k1p1/dpu.xclbin \  
./test_video_facedetect densebox_320_320 0 -t 1
```

```
env DISPLAY=:0.0 XLNX_VART_FIRMWARE=/mnt/sd-mmcb1k1p1/dpu.xclbin \  
./test_video_facedetect densebox_640_360 0 -t 1
```

NOTE1: Parameter -t says how many threads will be used.

NOTE2: Models can be also uploaded from PC to TE0808 folder /usr/share/vitis_ai_library/models or /usr/share/vitis_ai_library/.models

NOTE3: Use following command in case of X11 forwarding

```
env XLNX_VART_FIRMWARE=/mnt/sd-mmcb1k1p1/dpu.xclbin \  
./test_video_facedetect densebox_640_360 0 -t 1
```

4 References

- [1] TE0808 Starterkit Vitis AI Tutorial, Trenz Electronic Wiki: <https://wiki.trenz-electronic.de/display/PD/TE0808+Starterkit+Vitis+AI+Tutorial>