We are in AI times now!

Leo.Lee





Xilinx Deephi Edge Al Design Flow





Deephi DNNDK Design Flow



• 2.e) Reboot your machine.

DeePhi DPU Design Flow Choose



Description of Prebuilt Libraries

libraries	description	demo
libn2cube.so, libdputils.so	DNNDK libraries, encapsulating high level APIs of DPU	All demos
libdpumodelssd.so	DPU model for SSD network	traffic
libgstsdxtrafficdetect.so	gstreamer plugin for traffic detection	detection
libdpumodelyolo_google.so	DPU model for YOLOv2 network	pedestrian
libgstsdxpedestriandetect.so	gstreamer plugin for pedestrian detection	detection
libdpumodeldensebox.so	DPU model for densebox network	face detection
libgstsdxfacedetect.so	gstreamer plugin for face detection	
libdpumodel14pt.so	DPU model for human joints network	gesture
libdpumodelssd_person.so	DPU model for SSD network targeting person detection	detection
libgstsdxgesturedetect.so	gstreamer plugin for gesture detection	
libdpumodelsegmentation.so	pumodelsegmentation.so DPU model for segmentation network	
libgstsdxsegmentation.so	gstreamer plugin for segmentation	
libdpumodelresnet50.so	DPU model for ResNet50 network	image
libgstsdximgclassifier.so	gstreamer plugin for image classification	classification

deephi_ws

This is the workspace of the DPU demos. The projects list as follows

- dpucore_zu7: A hardware project that integrates DPU v1.3.0 c-callable IP for zu7 FPGA(Z
- dpucore_zu9: A hardware project that integrates DPU v1.3.0 c-callable IP for zu9 FPGA(Z
- gstsdxfacedetect: A face detection gstreamer plugin project.
- gstsdxgesturedetect: A gesture detection gstreamer plugin project.
- gstsdximgclassifier: A image classify gstreamer plugin project.
- gstsdxpedestriandetect: A pedestrian detection gstreamer plugin project.
- gstsdxsegmentation: A scene segmentation gstreamer plugin project.
- gstsdxtrafficdetect: A traffic detection gstreamer plugin project.
- • resnet50: A standalone project which implements classification using resnet50 model.



DNNDK Supported Networks

Application	Module	Algorithm	Model Development	Compression	Deployment
	Face detection	SSD, Densebox	√	✓	\checkmark
Face	Landmark Localization	Coordinates Regression	√	N/A	\checkmark
1 400	Face recognition	ResNet + Triplet / A-softmax Loss	√	✓	✓
	Face attributes recognition	Classification and regression	√	N/A	
	Pedestrian Detection	SSD	√	✓	v
Pedestrian	Pose Estimation	Coordinates Regression	\checkmark	√	 ✓
	Person Re-identification	ResNet + Loss Fusion	\checkmark		
Video Analytics	Object detection	SSD, RefineDet	\checkmark	✓	✓
	Pedestrian Attributes Recognition	GoogleNet	✓	✓	
	Car Attributes Recognition	GoogleNet	\checkmark	✓	\checkmark
	Car Logo Detection	DenseBox	\checkmark	J	
	Car Logo Recognition	GoogleNet + Loss Fusion	√	J	
	License Plate Detection	Modified DenseBox	√	√	\checkmark
	License Plate Recognition	GoogleNet + Multi-task Learning	√	√	√
	Object Detection	SSD, YOLOv2, YOLOv3	√	1	✓
ADAS/AD	3D Car Detection	F-PointNet, AVOD-FPN	√		
	Lane Detection	VPGNet	√	\checkmark	1
	Traffic Sign Detection	Modified SSD	√		
	Semantic Segmentation	FPN	√	✓ ✓	\checkmark
	Drivable Space Detection	MobilenetV2-FPN	√		
>> 6	Multi-task (Detection+Segmentation)	Xilinx	\checkmark		

Constraints Between Layers

Next Layer Layer Type	Conv	Deconv	Depth- wise Conv	Inner Product	Max Pooling	Ave Pooling	BN	ReLU	LeakyReLU	Element- wise	Concat	As Input	As Output
Conv	•	•	Ο	•	•	0	•	•	0	•	•	•	•
Deconv	•	•	0	•	•	0	•	•	0	•	•	•	•
Depth-wise Conv	•	•	0	•	•	0	•	•	0	•	•	•	•
Inner Product	•	•	0	•	•	0	•	•	0	•	•	•	•
Max Pooling	•	•	0	•	•	0	0	×	x	•	•	•	•
Ave Pooling	0	Ο	О	Ο	О	Ο	0	×	×	0	0	Ο	0
BN	•	•	0	•	•	0	0	•	×	•	•	0	0
ReLU	•	•	0	•	•	0	0	×	×	•	•		•
LeakyReLU	0	0	0	0	0	0	0	×	×	0	0		0
Element- wise	•	•	0	•	•	0	0	•	0	•	•		•
Concat	•	•	0	•	•	0	0	x	x	•	•		•

DPU Scalability



Revision History

The following table shows the revision history for this document.

Section	Revision Summary					
02/28/2019 Version 1.3						
Downloading DNNDK						
Setting Up the Host	Added DNNDK support for non-GPU host machines.					
Chapter 3: Upgrading and Porting – Since v2.08						
Network Compression						
DECENT Overview						
02/19/2019 Version 1.2						
Downloading DNNDK	Updated links to Xilinx product page with information about DNNDK-supported evaluation boards.					
Setting Up the Evaluation Board						
Setting Up the DP-8020 Evaluation Board						
Setting Up the DP-N1 Board						
02/07/2019 Version 1.1						
Setting Up the Host	Updated information.					
	Added liability notice.					
01/22/2019 Version 1.0						
General updates	Initial Xilinx release.					

Download to hardware verification DUP performance

Monito

Environment Setup and Installation

Deephi Demo Image for ZCU102: http://www.deephi.com/assets/2018-10-11-ZCU102-desktop-stretch.img.zip.

See3CAM CU30

Boot Mode Switch

>>

This image needs to be written to an SD card using Win32DiskImager or equivalent.

> **Kilinx USB** Adapte





DNNDK API

dpuOpen() dpuClose() dpuLoadKernel() dpuDestroyKernel() dpuCreateTask() dpuRunTask() dpuDestroyTask() dpuEnableTaskProfile() dpuGetTaskProfile() dpuGetNodeProfile() dpuGetInputTensor() dpuGetInputTensorAddress() dpuGetInputTensorSize() dpuGetInputTensorScale() dpuGetInputTensorHeight() dpuGetInputTensorWidth() dpuGetInputTensorChannel() dpuGetOutputTensor() dpuGetOutputTensorAddress() dpuGetOutputTensorSize() dpuGetOutputTensorScale() dpuGetOutputTensorHeight() dpuGetOutputTensorWidth() dpuGetOutputTensorChannel() dpuGetTensorSize() dpuGetTensorAddress() dpuGetTensorScale() dpuGetTensorHeight() dpuGetTensorWidth() dpuGetTensorChannel() dpuSetIntputTensorInCHWInt8() dpuSetIntputTensorInCHWFP32() dpuSetIntputTensorInHWCInt8() dpuSetIntputTensorInHWCFP32() dpuGetOutputTensorInCHWInt8() dpuGetOutputTensorInCHWFP32() dpuGetOutputTensorInHWCInt8() dpuGetOutputTensorInHWCFP32()

> For more details, refer to DNNDK User Guide

http://www.deephi.com/technology/ dnndk

https://www.xilinx.com/support/documentation/user_guides/ug1327-dnndk-user-guide.pdf



Verification Flow Chart



Adaptable. Intelligent.





Deephi AI solution support model and milestones check point



Support criteria

- 1.) Strategy account
- 2.) Great \$LTR
- 3.) Xilinx assigned
- 4.) Key account

Support resource

- A.) Deephi direct
- B.) Xilinx China Team
- C.) Xilinx Taiwan
- D.) Xilinx Forum
- E.) Anstek Team

Check Item

- Customer's network switch to Deephi form Nvidia.
- Xilinx add value them of advantages and disadvantages.
- DPU performance evaluation(T/GPOS, detection/loss)
- DNNDK error message and advanced design flow
- Why to choose Xilinx solution(Total cost, Competitiveness...)

EXILINX

Key factors in AI applications



What are the variables we can master?



Trade-Of

