Deep Learning Inference using FPGA

- FPGA를 활용한 딥러닝 추론 구현: LeNet and Yolo -

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강좌의 개요

이 강좌는 인공지능과 딥러닝에 대한 기초적인 내용부터 응용까지를
다루고,

딥러닝을 이해하고 응용을 개발하는데 필요한 다양한 이론적 배경과
개발 환경에 대해 상세하게 설명하며,

딥러닝 응용 중 대표적인 것을 구현하고 실습해 보는 과정을 통해
직접 경험해 보도록 한다.

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Target audience and prerequisites

- Target audience
  - ► This lecture is prepared for engineers and students who are interested in developing deep-learning application using FPGA

- Prerequisites
  - ► Experience with industry standard Operating Systems and text editor such as Windows/Linux and Vi/Vim.
  - ► Experience with industry standard C++ compilation tool-chain; GNU GCC
  - ► Basic knowledge of the C/C++ language
  - ► Experience with Xilinx FPGA development environment; Vivado
  - ► Basic knowledge of the Verilog-HDL language and digital logic design

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Goals and objectives

■ Goals
- ► Understanding of artificial intelligence, machine learning, and deep learning.
- ► Acquiring the working knowledge of deep learning model.
- ► Practicing development and running deep learning model.

■ Objectives
- ► Understanding of deep neural network
- ► Understanding of well known DNN for image classification.
- ► Understanding of deep learning frameworks: TensorFlow, Caffe V1, PyTorch and so on
- ► Understanding of LeNet
- ► Understanding of Darknet/YOLO
- ► Understanding of light deep learning networks: SqueezNet, ZynqNet, MobileNet, and so on (not included yet)

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Lecture schedule

	10:00	11:00	12:00	1:00	2:00	3:00	4:00
1st	0, 1	2		3, 4	5, 6	7	8
2nd	9, 10	11		12	13	14	A, B

■ 0: Lecture overview
■ 1: Introduction to AI and DL
■ 2: Introduction to DL
■ 3: Introduction to Python
■ 4: Simple NN using Python
■ 5: Introduction CNN
■ 6: LeNet introduction
■ 7. Introduction to Tiny-Dnn: LeNet
■ 8: Darknet LeNet and YOLO
■ 9: Deep Learning with FPGA

■ 10: Xilinx HLS and Fixed-Point data
■ 11: LeNet FPGA
■ 12: Yolo introduction
■ 13: Yolo V2 FPGA
■ 14: Lecture Summary
■ A: Caffe V1
- ► Introduction, install, getting started
- ► Caffe examples
■ B: TensorFlow
- ► Introduction, install, getting started, tensor, XOR
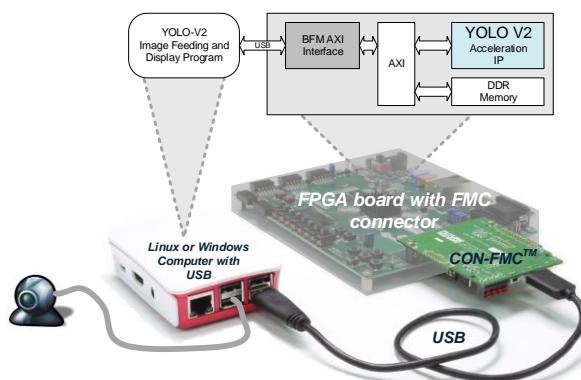- ► TensorFlow example

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What we are working on

■ High-performance
  ► PCI-Express FPGA card
  ► Refer to http://www.future-ds.com/en/products.html#DeepAccel-DualVU9P

DualVU9P Active Cooling Model

DualVU9P Passive Cooling Model

■ Low/medium-performance
  ► USB connection card
  ► Refer to video clips on http://www.future-ds.com

What we are working on

■ High-performance
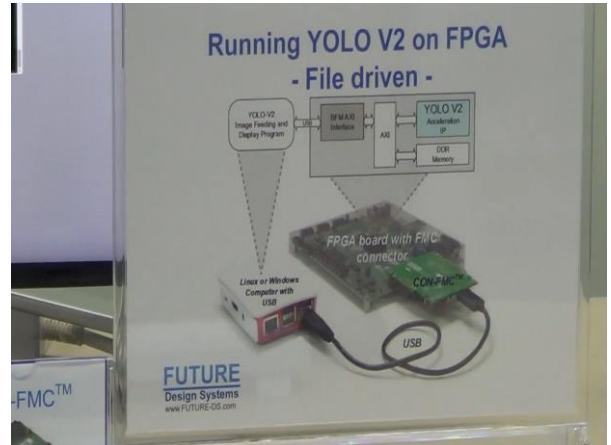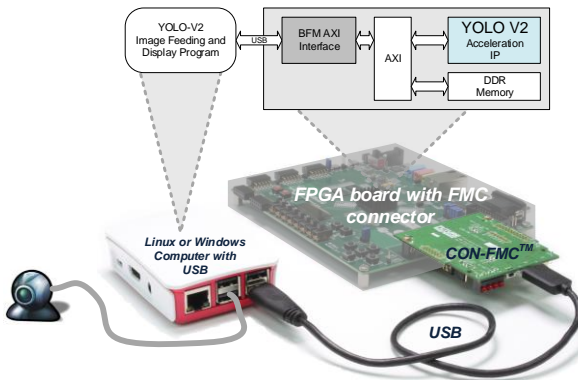 ► PCI-Express FPGA card
  ► Refer to http://www.future-ds.com/en/products.html#DeepAccel-DualVU9P

DualVU9P Active Cooling Model

DualVU9P Passive Cooling Model

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Running YOLO V2 on FPGA
- File driven -

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