Edge AI – Principles and Practices (1.0)

Scope

The full course is based on the development eight labs, which will cover the fundamental algorithms and typical applications in Edge AI, following a case-study format and fitting a typical semester course.

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Platform

BeagleBone AI 64 board running Imagination's Neural Compute Software Development Kit (NC-SDK-AC)

Audience

3rd year BSc EE and CS Students

Languages

English, Chinese (simplified) to follow

Week	Lecture Topic	Details
Module 1. Introduction to Edge AI	1. Introduction and Getting Started	Introduction to Edge AI and the experimental platform
		Lab 0: Getting started with the Pumpkin board
	2. Data acquisition and processing on the Edge	Image processing fundamentals
		Lab 1: Image acquisition and processing with OpenCV
	3. Introduction to Machine Learning on the Edge	Introduction to Machine Learning, the IMG Neural Compute SDK and the IMGDNN library
		Lab 2: First steps with the NCSDK
		Lab 3: My first Neural Network on an edge device
		Lab 4: My first Neural Network with imgDNN
Module 2. Image vision	4.Image classification	Image classification on edge device
		Lab 5: Image classifier example on an edge device
	5. Image segmentation	Image segmentation on Edge devices
		Lab 6: Semantic image segmentation on an edge device
	6. Object detection	Object detection on edge devices
		Lab 7: Object detection on an edge device
Module 3. Speech and natural language processing	7. Automatic Speech Recognition (ASR). Available in version 1.1	Automatic Speech Recognition for Edge Devices
		Lab 8: Voice control on the edge
	8. Natural Language Processing (NLP). Available in version 1.1	NLP Fundamentals
		Lab 9: Automatic question answering on the edge
Module 4. Advanced topics	9: Advanced NCSDK and OpenCL usage. Available in version 1.1	Advanced NCSDK and OpenCL usage.
		Lab 10: OpenCL-based pre- and post-processing

IUP Website

The focal point to access our services is the IUP website: teaching materials, video tutorials, forums, suggested hardware, recommended textbooks, pictures, news, and workshop + event listings.

Requesting teaching materials

Visit Imagination University Programme website:
https://university.imgtec.com/teaching-download/

You can request all teaching materials by submitting the form without registration

After submission, you will receive an email to set up your download account: email and password

Filling in the request form

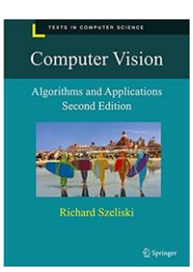
Request the materials you want

- Tell us what you plan to do

- We will assess and respond to your request within 3 working days

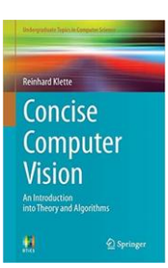
Once approved, you will receive an email with the download link. Be prompt: the link is valid for 7 days.

Useful Textbooks



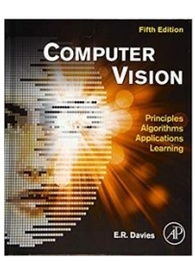
Computer Vision: Algorithms and Applications

Richard Szeliski, 2022.



Concise Computer Vision: An Introduction into Theory and Algorithms

Reinhard Klette, 2014



Computer Vision: Principles, Algorithms, Applications, Learning

E. R. Davies, 2017

Hardware Tools

BeagleBone® AI-64

This new BeagleBoard.org® features a PowerVR 8XE (GE8430) GPU, an Arm A72 CPU and a C7x DSP. Based around a TI Jacinto TDA4VM SoC, running Yocto or Debian, it's an easy way to access an Imagination GPU running full OpenCL. Together with Imagination's Neural Compute SDK Academic Edition, it is an excellent platform to explore Edge AI applications.