ARTIFICIAL INTELLIGENCE IN EMBEDDED SYSTEM
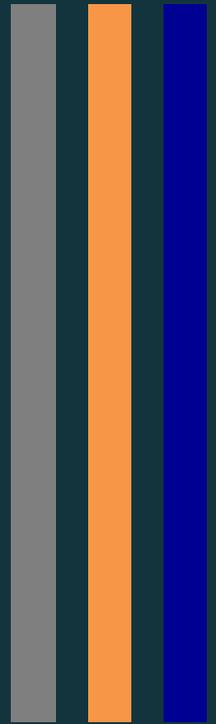
Prepared by:

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1.0 INTRODUCTION

Have you ever thinking to deploy trained machine learning model on-site yet is limited by the physical size of a GPU-equipped machine learning desktop?

Have you ever thinking to deploy machine learning inference on your microcontroller embedded projects but is limited by the processing power of embedded microprocessor available in the market?

Huawei introduces Huawei Atlas 200 Development kit, a small yet powerful computer that allows multiple neural networks in parallel for applications like image classification, object detection, segmentation, and speech processing. Powered by the Huawei Ascend series AI processors, a single chip delivers 16 Tera Operations per second (TOPS) of INT8 and 8 Tera floating-point operations per second (TFLOPS), the fastest embedded AI computer available in the market to-date. It supports real-time analytics of 16-channel HD videos with reasonable low power consumption.

This Huawei Atlas intelligent computing platform is powered by the Huawei Ascend 310 series AI processors and mainstream heterogeneous computing components. This rich array of product form factors is widely applied to domains such as safe city, smart transportation, smart healthcare, and AI inference.

Atlas 200 DK AI Developer Kit

Huawei Ascend 310 Processor with Da Vinci Architecture

GPU performance up to 8 TFLOPS FP16 (16 TOPS INT8)

ARM® Cortex™A55
8-Core up to 1.6 GHz (ARM v8 instruction set)

LPDDR4x, 8 GB, and 3,200 Mbit/s

1x microSD card slot, SD3.0, max capacity of 2 TB

2 x 22-pin MIPI connectors

1x Gigabit Ethernet RJ-45 port

1x USB 3.0 Type-C port as a slave device

1 x 40-pin I/O connector

32.9 mm x 137.8 mm x 93.0 mm

2 x onboard microphones

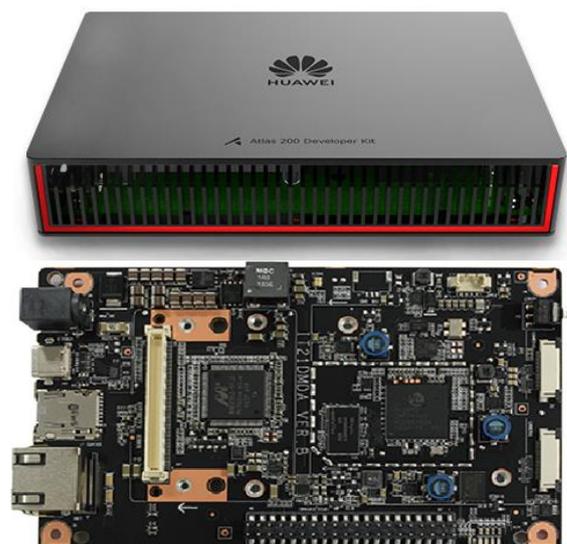*24W power consumption with 12nm FFC technology*

Image courtesy: Huawei Technologies

2.0 Program Outline

This training is specially customized to new user of Huawei Atlas 200 Development Kit, who wishes to migrate their existing AI projects to Huawei Ascend computing platform. MindStudio, the software environment uses by this development kit, is an easy-to-user, user-friendly programming interface with graphics-based debugging capabilities, allowing automatic management of offline models with a simulation environment. This courseware is built with the intention to help developers quickly familiarize with the development environment, and therefore, being able to put more emphasis on the embedded system projects development the user is working on.

During this training, students will be exposed to the architecture of the AI core, namely Da Vinci Architecture, and Huawei uniquely designed 3D Elastic cube unit to speed up machine learning model inference. Apart from that, students will get to learn the software stack of Ascend AI processor and data orchestration flow within the core, before moving into step-by-step hands-on experience on building their first application with Huawei Atlas 200 Development Kit in Ubuntu environment.

Throughout the course, pre-trained deep learning models will be deployed during the hands-on part of the courses, and therefore, no coverage on machine learning model training nor Tensorflow framework training will be included.

2.1 Learning Outcomes

Upon completion of this course, participants shall be able to:

- Understand and articulate the hardware architecture and software stack of Huawei Ascend AI Platform.
- Get to familiarize with the tools and environment required to kick-start AI-enabled embedded projects as well as AI IoT projects with Huawei Atlas 200 Development Kit.
- Build first AI face-recognition application with Huawei Atlas 200 Development Kit.
- Troubleshoot hardware failures and software bugs commonly seen during embedded system development.

Day 1:

Theory:

- An Overview of AI and solution case study
- Huawei Ascend AI Hardware Architecture
- From Neural Network to Hardware: Full pipeline ascend software development toolchain

Hands-on:

- Step-by-step guide to setup Huawei Atlas 200 Development Kit development environment: Ubuntu environment preparation, SD card preparation, Atlass 200DK Environment Configuration.
- **App 1:** Quick deployment of facial recognition application with Huawei Atlas 200 DK.

Day 2:

- **App 2:** Image Classification application development with graphical drag-and-drop programming on Mind Studio. (Zero programming required)
- **App 3:** Step-by-step guide to building first face detection recognition application with Mind Studio software in Python Language.

3.0 Pre-requisites

This is not a machine learning 101 class. Participants are required to understand deep learning theories, the working of neural network/CNN training, mainstream deep learning framework TensorFlow, and mainstream datasets and pretrained models like AlexNet, ResNet, Yolov2, ImageNet. Practical hands-on experience on building and training machine learning model will be a plus. The hardware will be run in Ubuntu environment therefore prior experience on using Ubuntu is a must. Most of the code is pre-written in Python. No coding is required from scratched but understanding of code is essential. Students are required to have their laptop running in Ubuntu environment (dual-boot or Virtual Machine). All other hardware required to conduct the course will be provided.

4.0 Learning Methodology

The course will be conducted in two major ways: lecture on the theory part, while hands-on on the practical part. Classroom discussions will be carried out throughout the entire course.

5.0 CHARGES

Please request for an official quotation from sales representative in contact details below.

6.0 CONTACT INFORMATION

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