Edge AI and Robotics Teaching Kit

Module 1 Lab:  
**Parallel Programming**

The purpose of this lab is to introduce the student to the CUDA platform along with their capabilities. The student is not expected to understand the details of the code, but should understand the process of compiling and running code. Each notebook is individual and consists of the following four notebooks.

* Notebook1: Introduction to CUDA and PyCUDA
* Notebook2: Introduction to CUDA Python with Numba
* Notebook3: Array summation and matrix multiplication
* Notebook4: Benchmarking speed: NumPy, CuPy

The notebooks should run on a PC with GPU.

To run the notebooks on your Jetson, you will [use l4t-ml container](https://ngc.nvidia.com/catalog/containers/nvidia:l4t-ml)) which already has the prerequisite libraries. It’s a machine learning container that contains TensorFlow, PyTorch, JupyterLab, and other popular ML and data science frameworks such as scikit-learn, scipy, and Pandas pre-installed in a Python 3.6 environment.

**Run the container**

1. First, you should pull one of the l4t-ml container tags from the list, corresponding to the version of JetPack-L4T that you have installed on your Jetson. For example, if you are running the latest JetPack 4.6 (L4T R32.6.1) release:

sudo docker pull nvcr.io/nvidia/l4t-ml:r32.6.1-py3

1. Then to start an interactive session in the container, run the following command:

sudo docker run -it --rm --runtime nvidia --network host nvcr.io/nvidia/l4t-ml:r32.6.1-py3

1. You should then be able to start a Python3 interpreter and import the packages above.

Please check out the [link](https://ngc.nvidia.com/catalog/containers/nvidia:l4t-ml) for more information about the container.

**References:**

* Please refer to this [page](https://developer.nvidia.com/cuda-toolkit) to learn about CUDA toolkit.
* Please refer to this [page](https://documen.tician.de/pycuda/tutorial.html) to learn about PyCUDA.
* Please refer to this [page](http://numba.pydata.org/) to learn about Numba.
* Please refer to this [page](https://cupy.dev/) to learn about CuPy.
* Please refer to this [page](https://numpy.org/) to learn about NumPy.