Seamless TinyML lifecycle management

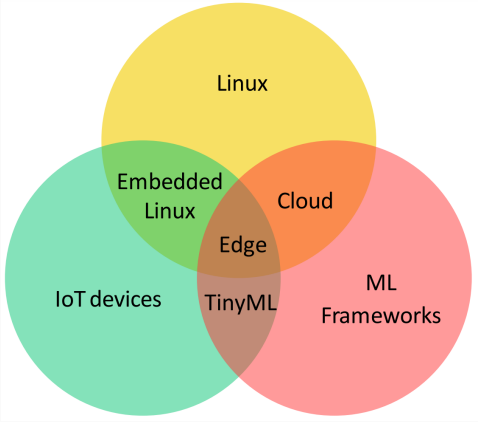
In Software Engineering Project with University of Helsinki CS

16/1/2023

Origami@NEXUS

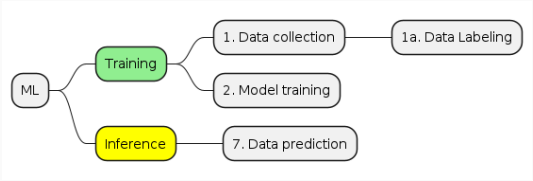
Project goal

*"The main goal of this software engineering project is to develop a solution that enables a seamless **TinyML lifecycle management**. In particular, the idea is to build a framework that **in an automated fashion** performs the different steps of the TinyML lifecycle management."*

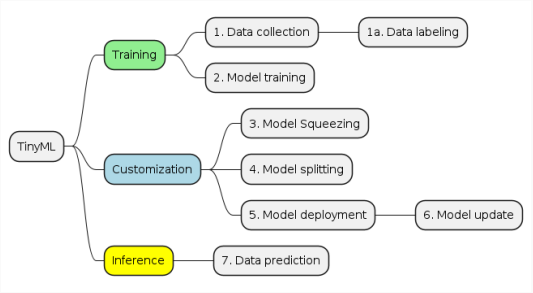


Lifecycle of: ML vs TinyML

(Cloud) ML



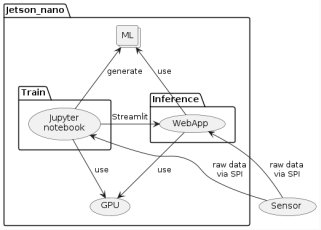
TinyML



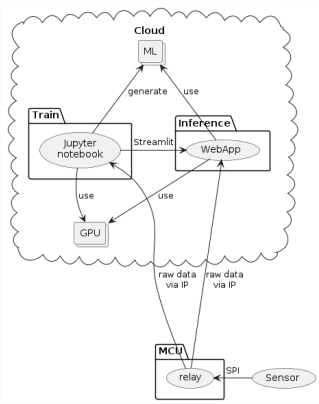
Arch: Edge ML vs Cloud ML vs TinyML

Edge ML

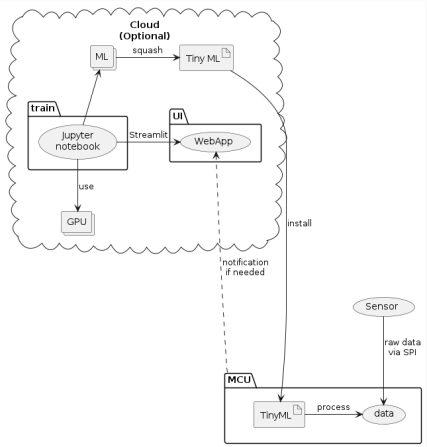
(Local ML)



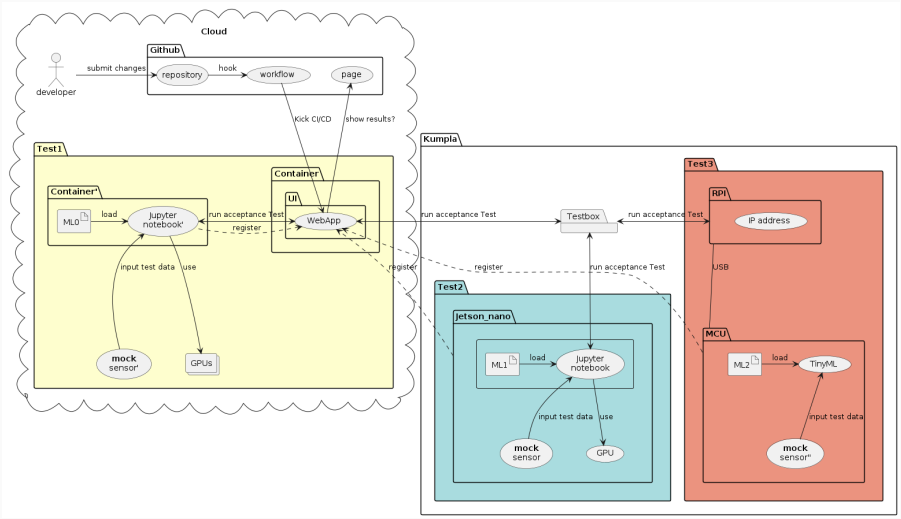
Cloud ML



TinyML



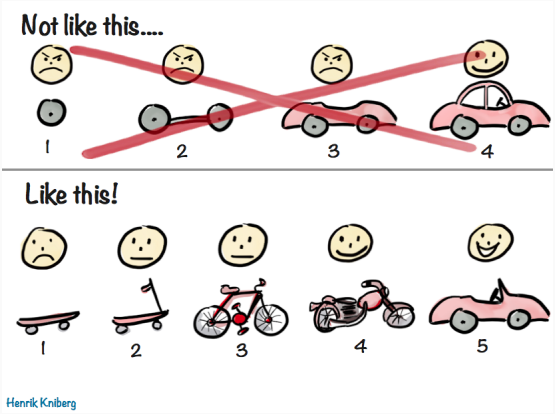
CI / CD / ATDD



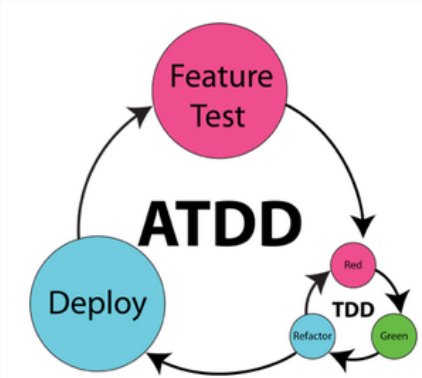
The simplest **Test1** can run the TFLite micro Hello World in a container w/o HW.

MVP iteration

Always runnable MVP at Day 1



Acceptance Test Driven Development



TensorFlow Lite for Microcontrollers*

ML model Examples

- hello_world
- magic_wand
- memory_footprint
- micro_speech
- mnist_lstm
- network_tester
- person_detection

Supported platforms

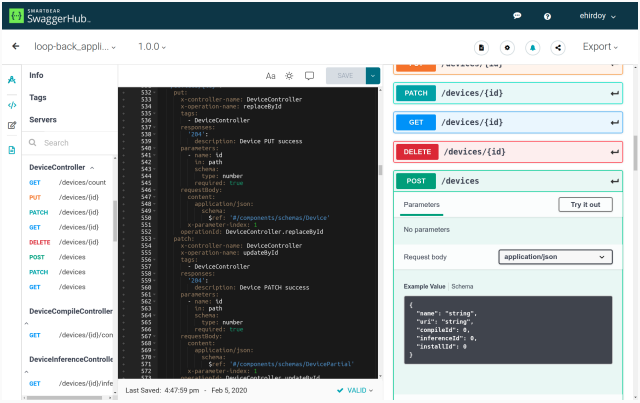
TensorFlow Lite for Microcontrollers is written in C++ 11 and requires a 32-bit platform. It with many processors based on the Arm Cortex-M Series architecture, and has been porte including ESP32. The framework is available as an Arduino library. It can also generate prc environments such as Mbed. It is open source and can be included in any C++ 11 project.

The following development boards are supported:

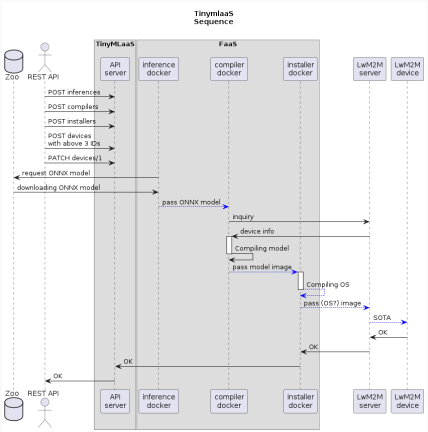
- Arduino Nano 33 BLE Sense
- SparkFun Edge
- STM32F746 Discovery kit
- Adafruit EdgeBadge
- Adafruit TensorFlow Lite for Microcontrollers Kit
- Adafruit Circuit Playground Bluefruit
- Espressif ESP32-DevKitC
- Espressif ESP-EYE
- Wio Terminal: ATSAMD51
- Himax WE-I Plus EVB Endpoint AI Development Board
- Synopsys DesignWare ARC EM Software Development Platform
- Sony Spresense

Automate with TinyMLaaS API

Open API spec over simple IoT system



Function as-a-Service (FaaS)



Streamlit vs Pyscript+API server depends on how to demonstrate user story?

Contact information

Origami

https://Origami-TinyML.github.io/blog/about.html