Comparative Study of Single Board Computers for AI Edge Computing Purposes

Introduction

The deployment of self-driving vehicles is one of many new and interesting low-latency applications. To aid to lower latency during localization in position fixing, a benchmark is proposed to examine the potential of executing a trained Neural Networks (NN) or Machine Learning (ML) algorithm on edge devices like the Nvidia Jetson Nano, Google Coral Dev and Raspberry Pi 3 compared to regular computer.

Data acquisition

In order to achieve a representative benchmark, it is necessary to investigate the performance of different programs on each edge device in an identical manner. In this benchmark several different programs are tested spread across categories of NN as regression and classification. For each program the duration of execution and utilization of the processor unit is measured and stored. To achieve statistically results, every program will be run for 20 different iterations.
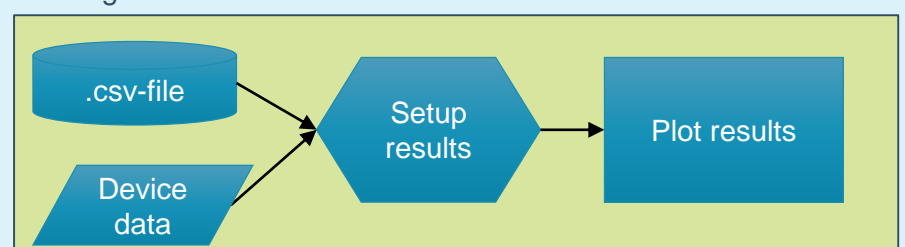
Training models:
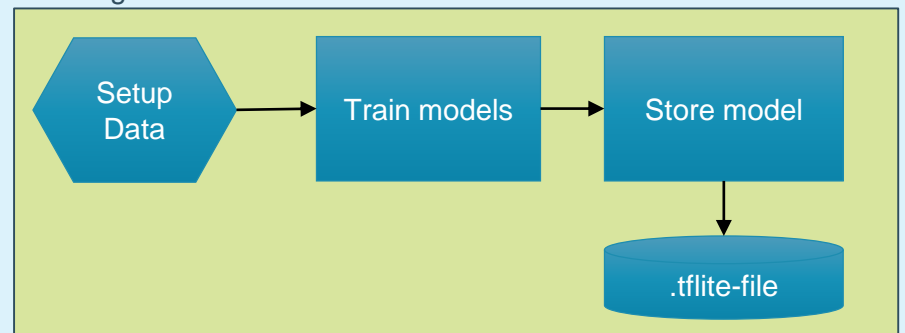
Running models:
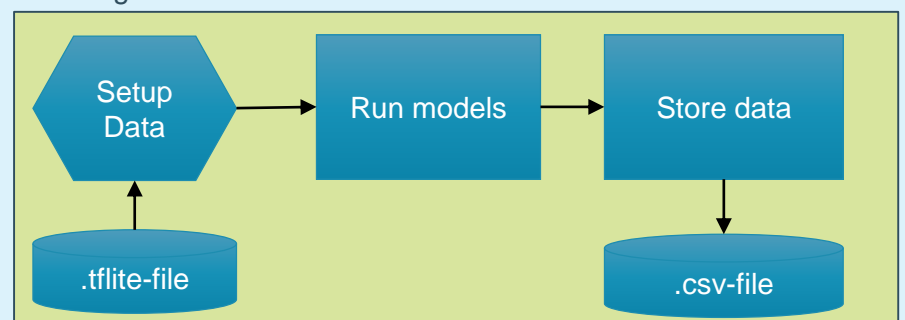
Plotting results:

Data analysis

To compare the performance of different edge devices, latency data will be adjusted for variables like processor usage, clock speed, price and energy usage. The results are normalised to ease a comparison.

Conclusion

The results show that among edge-devices, the Jetson Nano is the Single Board Computer with the lowest latency. When comparing power consumption for the given latency, the Coral Dev is the most power efficient.

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