Live Demonstration: Deep Learning-Based Visual Tracking of Multiple Objects on a Low-Power Embedded System

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***Abstract*—Multiple object visual tracking of real time detected objects using a low-power embedded solution is shown. The proposal is implemented on a NVIDIA Jetson TX2 development kit demonstrating the feasibility of deep learning techniques for IoT and mobile edge computing applications.**

I. Fundamentals

A proposal for multiple object tracking was developed making use of the Hardware-Oriented PBAS (HO-PBAS) algorithm [1] to detect moving objects integrated with the GOTURN CNN based tracker [2]. Instead of more robust techniques to solve the one object to multiple objects extension, which sometimes suffer from low speed [3], a more straightforward solution was used to develop an end-to-end solution over a low-power embedded platform for real time performance [4].

II. Demonstration Setup

The experimental set-up during execution is shown in Fig. 1. A 3S LiPo battery is used to power a Jetson TX2 development kit [5]. The platform is remotely controlled by a tablet using WiFi connection, which is also used to visualize live performance. NVIDIA Jetson TX2 is an AI SoC for inference at the edge, which is offered as a 50x87 mm and 85 g weight single board computer and also in a ready to use development kit. The latter includes a 5MP CSI camera, WLAN and Bluetooth connectivity and several peripherals, thus development from beginning to end can be accomplished from the early stage. It is powered by NVIDIA Pascal GPU architecture and it consumes between 5 and 15 W, far below the discrete GPUs, which swing between 150 and 250 W. Consequently, Jetson TX2 was chosen due to its power-efficiency, small dimensions and high throughput.

III. Visitor Experience

The camera of the Jetson TX2 development kit captures a scene while the multiple object visual tracking algorithm is running on the platform. The camera output and the tracking result are displayed on a tablet which can be used by the visitor to monitor live processing capability. Thus, visitors can experience the complete end-node performance which demonstrates the feasibility of deep learning techniques for real time decision making based on visual tasks in a embedded solution which consumes less than 15 W.

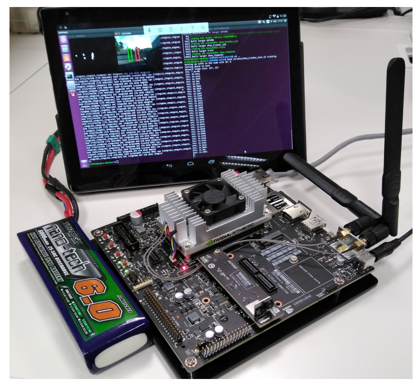

Fig. 1. Experimental set-up: live visual tracking is displayed on a tablet, which also controls the battery powered Jetson TX2 development kit used to capture and process the scene.

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