Topic for a

Project work / Studienarbeit

Object detection with Jetson Nano Plattform

At the Chair of Fundamentals of Electrical Engineering, low bit neural networks are studied by reducing required weight precision and allowing a transition towards novel neuromorphic architectures based on memristive devices. In addition to their intrinsic non-linearity, most common memristive components are limited in their on-off ratio, which leads to bit precision below 8 bits. For this reason, it is of interest to demonstrate the ability of neural networks to work with this low precision and maintain an acceptable network accuracy. An available Jetson Nano hardware platform offers a GPU-accelerated neural network and can be coupled with a camera for object detection that mimics low-power mobile applications. Object detection applications with Jetson Nano are shown in the literature [1].

Within the scope of a scientific work, this work focusses on low bit object detection using the Jetson Nano hardware platform and comparing the performance or detection frame rate considering low bit neural networks.

The student research project should include, but not be limited to, the following:

- Literature search on training of low bit neural networks for object detection
- Training of a neural network for different bit precisions on a custom dataset
- Implementation and test of the object detection performance on a Jetson Nano Hardware Plattform
- Comparison of different bit precisions as well as with like state-of-art models like Yolo and MobileNet
- Documentation of the results

For this work, a very good knowledge of the basics of neural network training and Python programming is required.

References:
[1] SALEH, S., et al. "Collision warning based on multi-object detection and distance estimation". In: International Symposium on Computer Science, Computer Engineering and Educational Technology (ISCSET-2020), page 68–72, TUDpress, Verlag der Wissenschaften GmbH, Dresden.

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