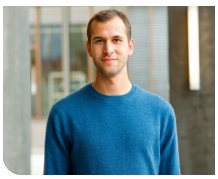
Tiny ML wildlife camera

Creation of a wildlife camera with integrated image classification

Student



Marc Benz

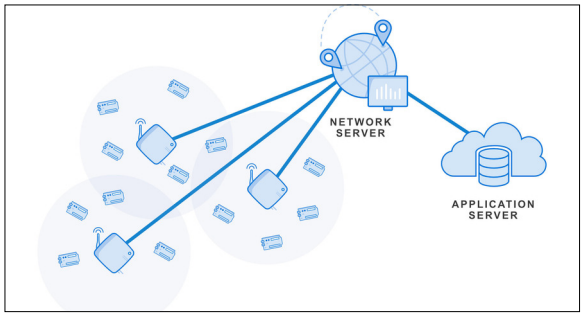
Introduction: The interest in deep learning has grown rapidly in the last years. Especially in the field of image processing. In more recent times there has been an effort to get this technology to the edge. Microcontrollers are omnipresent and have more and more computing power. In this thesis the aim is to create a demonstrator of a wildlife camera, showing the possibilities of deep learning on low power devices.

Approach / Technology: The demonstrator is based on a Portenta H7 with a Vision Shield. The model running on it is a MobileNet which is pretrained on the ImageNet dataset and trained on a wildlife dataset. It is then quantized and converted to a TensorFlow Lite model. The results of the classification are sent to a server via LoRaWAN.

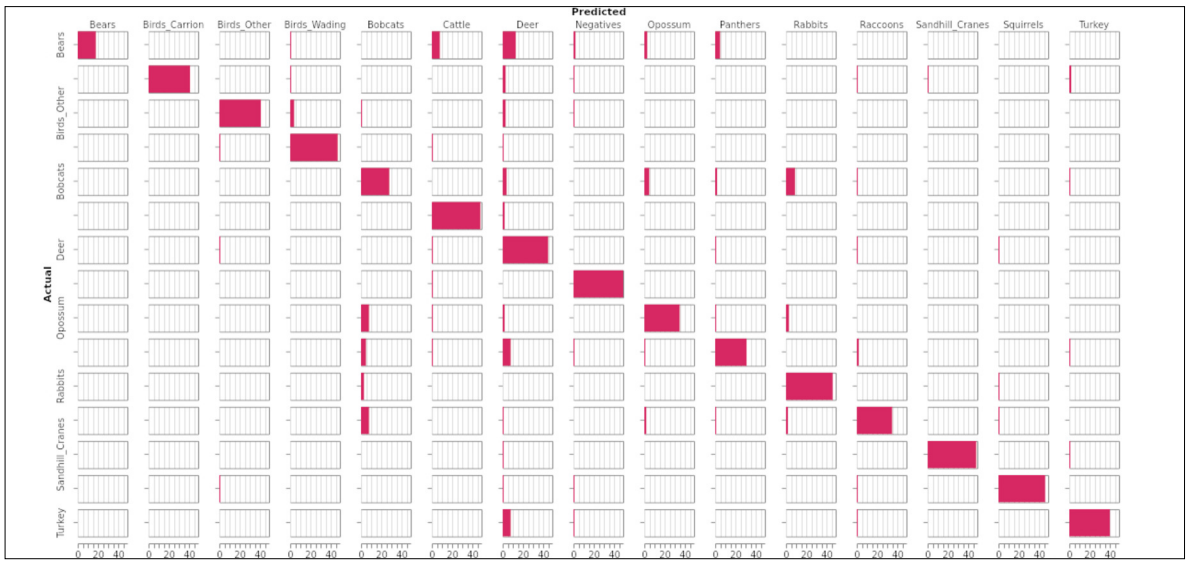
Conclusion: The demonstrator is able to classify 15 different animals with an accuracy of around 80% on the test set. The model has less then 1 second inference time on the Portenta H7 and a power consumption of around 0.6 W.

Image of a Bobcat out of the dataset.
https://arxiv.org/abs/2106.12628

Overview over LoRaWAN using The Things Network. Including Enddevices, Gateways and Servers.
https://www.thethingsnetwork.org/docs/network/



Performance on the training set.
Own presentment



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Subject Area
Data Science, Electrical Engineering, Software and Systems