Edge computing devices assessment for cryptography and biomedical signal analysis

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Edge computing as a part of distributed computing implies data processing in the place where they are acquired, not only for the better network performance but also for security reasons. Multi-biometric sensor traces of personal data are collected on the servers rapidly and in an extensive amount. There is no sense to send speech recording to a server for the recognition to simply turn on the light in the room by using the voice command if decent local processing is available. Besides, such computing is often required in circumstances without or with a limited network connection as well as low-latency decision-making systems are crucial for self-driving vehicles and aircraft. Since portable devices with Tensor Processing Units (TPU) emerged to the market, accessible low-power and low-price local inference with artificial intelligence (AI) has became possible.

In this abstract we review the runtime performance, area, and the limits of usage of the Intel Neural Compute Stick 2, Coral USB Accelerator, and Coral Dev Board. We are interested not only in image recognition, what these devices were made for, but in real-time binary data processing. Also, power consumption and scaling availability are crucial characteristics. We plan to use portable TPU devices for a wide range of applications including real-time processing of biomedical signals, e.g. electroencephalograms. As a possible application we propose the AI pattern recognition of bit values of a processing scalar in measured power or electromagnetic traces from the work by Kabin, Aftowicz, Varabei, Klann, Dyka & Langendoerfer (2019).

References

I. Kabin, M. Aftowicz, Y. Varabei, D. Klann, Z. Dyka & P. Langendoerfer (2019). Horizontal Attacks using K-Means: Comparison with Traditional Analysis Methods. In *2019 10th IFIP International Conference on New Technologies, Mobility and Security (NTMS)*, 1–7. ISBN 978-1-7281-1542-9.

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