Master Thesis Topic

Energy Efficient ECG-Based Heartbeat Classification and Arrhythmia Detection

Keywords

Machine Learning, Deep Learning, Edge computing, Time Series Classification, Python, TensorFlow, Pytorch

Description

In recent years artificial intelligence and deep learning have witnessed many breakthroughs and advances that allowed them to be applied to almost every aspect of life, from autonomous driving to breast cancer classification. At the same time, the computational power of edge devices has increased drastically allowing them to run tasks that required computers of the size of a big room many years ago.

In this master thesis, jointly supervised by IDS and ISEK, the student is expected to design a machine learning based system that processes the ECG of a person and detects irregularities like arrhythmia. The system is expected to meet a certain performance goal. After developing a model that successfully achieves a performance that is equal or exceeds that goal, an improvement on the energy consumption will be done to ensure that the model is running with as low energy consumption as possible. The student will gain lots of practical experience as well as good knowledge of state of the art research in time series classification and optimising inference time for neural networks’ architecture. The task are as follows:

- Analyze and understand the already-built IoT system
- Review and understand the latest literature on the topic of time series classification using machine learning
- Improve the run-time and communication overhead using different machine learning techniques
- Design an application scenario on the IoT system to test the developed algorithms

Requirements

- Basic knowledge of algorithms and statistical modelling
- Good knowledge of machine learning models
- Python programming skills
- Basic experience with libraries like Tensorflow and/or Pytorch

Contact

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Figure 1: Overview of the proposed system pipeline