Universität Rostock | Fakultät für Informatik und Elektrotechnik
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Topic for Specialization Module/Master Project

Random Forest code generation for microcontrollers

Code Generierung von Random Forest Klassifikatoren für Mikrocontroller

Machine Learning has become a phenomenon pervasive to many aspects of daily living and is used in different classification and regression tasks. One popular application is inertial sensor-based gesture recognition in wearables. One important factor in the use of wearable devices is battery life: every measure used to reduce the power consumption is useful in the design of such devices. One such measure is the use of on-sensor signal processing. Small ensemble classifiers like Random Forest for simple recognition tasks can run on small sensor hubs.

In this work a process for the generation of C/C++ code for a small sensor hub (BMF055) from decision-tree-based classifiers trained in python using scikit-learn is developed and automated. Additional tools are developed to determine whether these classifiers able to run on the target hardware. The results will be then evaluated w.r.t. functional and extra-functional properties of the system. If these tasks are completed, additional work can be done in replacing floating-point operations in the microcontroller code with fixed-point or integer operations.

The following tasks have to be performed:
- Literature research and familiarization with Random Forest and Adaboost classifiers
- Familiarization with scikit-learn
- Implementation of an automated toolflow from python to C/C++ code
- Evaluation of this toolflow and the resulting C/C++ code
- Documentation of results

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