

Master's Thesis

Development of a Multi-Agent Reinforcement Learning Approach for an MPSoC

In latest research, machine learning has been successfully applied to many kinds of problems like picture classification or control. Machine learning has shown to be able to build highly accurate models also for a big amount of sensor data. In many problems, like autonomous driving, coordination between different entities (cars) which are controlled individually is necessary to optimize for a specific goal (routing with least average travelling time).

In such problems mainly two approaches exist: the (1) centralized and the (2) decentralized one. In the first (1) one, all sensor data is shared with a central controller which processes it. In the decentralized (2) manner only parts of the data is shared between the different entities, which decide on their actions locally based on the available information.

In our IPF project, we use rule-based RL (LCT) to optimize runtime parameters (DVFS, Task mapping) of MPSoCs.

Currently per-core LCTs optimize locally without knowledge about a common goal or the state of other LCTs and their cores.

This MA is investigating how to achieve coordination between the per-core LCTs by

- comparing known approaches in literature
- comparing their applicability in simulation
- implementation and evaluation of one approach on an FPGA prototype

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