Chair for Integrated Systems
TUM Department of Electrical and Computer Engineering
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Master's Thesis

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

LCSs, especially XCSs, have been applied successfully for a classification and control problems in recent research.

Hereby, control problems represent the more challenging kind of problem to solve. That's caused by the fact, that control often involves a sequence of steps (imagine a PI controller which overshoots first and reverts afterwards) to achieve the specified target. Additionally, compared to classification, the final outcome doesn't result in a binary feedback (true / false), but might be the deviation from the target which is represented as a value in a continuous range.
In the classification community, approaches are developed which solve these issues by multi-step learning (sequence of decisions which are rewarded together) and new encoding of conditions.

In our IPF project, we use rule-based RL (LCS) to optimize runtime parameters of MPSoCs. Currently, per-core LCTs optimize these parameters with single step decisions.

This MA is investigating which multi-step learning approaches can be applied to controlling MPSoCs by

- comparing latest multi-step learning approaches in literature
- comparing their applicability in simulation
- implementation and evaluation of one approach on an FPGA prototype

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