Online control of lab pond setup - first try

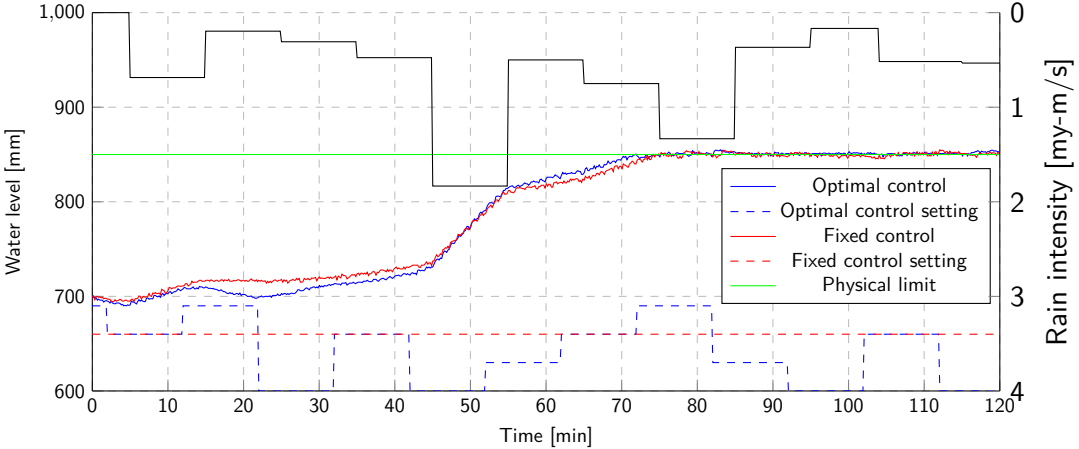
Experiment design and results

September 20, 2023

Experiment design

- Online control: i.e., a strategy is synthesized periodically where the model is re-calibrated to the latest water level sensor reading.
- Experiment duration: 120 minutes.
- Rainfall data: first 120 minutes of the data.
- Initial water level: 700 mm.
- Physical water limit of setup: 850 mm.
- Duration single control period: 10 minutes.
- Optimization cost function: min $\mathbb{E}(o)$, where o is the accumulated overflow duration.
- Fixed outflow is setting 2 (approx. 50% of pump capacity).
- Learning budget parameters: –good-runs 100 –total-runs 200 –runs-pr-state 100 –eval-runs 100
- Discretization: 0.03.

Experimental results



Analysis

Possible explanations for 'bad' results

- Learning took about 1,5 minutes, so the new control action was applied 2 minutes after learning has started.
- The learning budget is low, but the CPU speed of the server is the limiting factor.
- The control period is 10 minutes and control horizon 2 hours, so each time a sequence of 12 control decision has to be learned $\rightarrow 4^{12} \approx 1.7 \cdot 10^7$ possible control sequences.

Idea for next experiment

- Switch to a control period of 15 or 20 minutes, so less decision points to consider.
- Increase learning budget so more time is used for learning, like maybe 3-5 minutes for learning.