MSc project in

Distributed Model Predictive Control for Flood and Water Management

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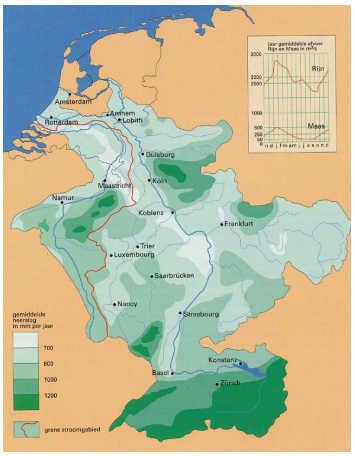
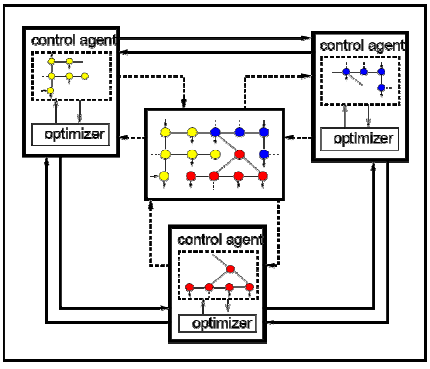
The importance of an efficient and reliable flood and water management system is increasing, due to among others higher sea levels, more heavy rain during the spring season, and possibly also drier summers.

Water management is distributed among many local bodies. Local control actions include activation of pumps or locks, filling or draining of water reservoirs, and opening of emergency water storage areas. Too high water levels (flooding) and too low water levels (for agriculture and irrigation) should be avoided, while minimizing the cost of the local actions.

Local water management bodies usually only control water levels in a relatively small region. However, the evolution of the water levels is influenced by what happens over a much larger region, often extending far beyond the neighborhood of the given region. The currently uncoordinated and localized control results in suboptimal overal system performance.



Major European rivers cross multiple countries (source: natuurdichtbij.nl).



Multi-agent model predictive control (source: Negenborn, 2007)

By cooperating and by coordinating the local water management actions, and by also taking into account predictions or forecasts of future rain fall, future droughts, and the future arrival of increased water flow via rivers, etc. (using various weather and hydrological sensors and prediction models) a more efficient flood and water management can be obtained with less risks and less costs. As some of the local requirements may sometimes be conflicting, a multi-constraint and multi-objective coordination and control task has to be solved.

Therefore, we are currently developing novel intelligent multi-agent model-based predictive control approaches for flood and water management. These approaches will guarantee the basic requirements and service levels to perform adequate flood and water management.

If you are interested in doing an MSc project in this direction, don't hesitate to contact
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