

# Prediction-Based Nature-Inspired Dynamic Optimization

*Wednesday, July 29, 2020 7:30 PM (1 hour)*

The poster will give insights into my PhD research. I combine time-series prediction and heuristic optimization algorithms to cope with time-varying optimization problems. A frequent task in dynamic optimization is to track the moving optimum as accurately as possible. Originally designed for static optimization, nature-inspired algorithms on dynamic problems suffer from premature convergence. To circumvent this different approaches have been developed, prediction is one among others. The trajectory of solutions found during the optimization process is interpreted as representation of the optimum dynamics. With time-series prediction techniques that are learned online, for this trajectory the next step is predicted which in turn is employed to lead the optimizer's search in direction of the predicted optimum. By this means, a faster convergence and tracking accuracy might be achievable.

In my thesis, I investigate different neural network architectures as prediction models, and propose strategies to utilize the prediction in nature-inspired optimization algorithms (evolution strategy, particle swarm optimization). Furthermore, I suggest to adapt the optimizer's operators based on the predictive uncertainty in order to prevent the optimizer from being misled by a poor prediction.

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