

Research project / Student thesis

Implementation of optimization algorithms for an augmented reality demonstrator

Motivation

Many problems in industry and economy require an optimal solution with respect to certain criteria and constraints. Mathematically formulated, this leads to an optimization problem, which can only be solved numerically in many cases. In order to illustrate such algorithms, the Chair of Automatic Control has built an augmented reality sandbox. A depth camera measures the height profile of the sand, which can be interpreted as two-dimensional cost function. The optimization process can then be projected onto the sand.

Task description

Some basic optimization algorithms like particle swarm, Nelder Mead simplex, and line search methods have already been implemented. The task is to implement further methods, which can range from trust region methods for unconstrained static optimization, ant colony algorithms for combinatorial optimization, up to model predictive control of dynamical systems.

Thereby, the height profile of the sand should be used in the cost function or the constraints, and the process of the algorithm should be illustrated by projection onto the sand.

Requirements

Basic knowledge of optimization algorithm and experience with MATLAB programming are of advantage.

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