

Context

Knowledge-based Configuration, Qualitative Reasoning, Constraint Programming, Artificial Intelligence

Background

TUM's Model-based Systems & Qualitative Reasoning group is currently engaged in developing a generic, constraint-based configuration system called GECKO. The project aim is to develop an application-independent software solution for solving user-focused configuration problems. The first application is a training planer for fitness studios called INFIS (Intelligent Fitness Studio).

For GECKO, a configuration problem is considered as a constraint-satisfaction-problem. The constraints describe the requirements a user has on a configuration as well as the restrictions deriving from the application domain. One challenge is to incorporate user preferences in the configurations, as over-constraining a problem usually leads to unsolvable scenarios. One possible approach are soft constraints.

Soft constraints, i.e. constraints, whose satisfaction is desired, but not necessary, are used in constraint-satisfaction-problems, where over-constraintness is expectable or unavoidable. A CSP is over-constraint, if there is no possible value assignment that satisfies the constraints. In such a case, constraints are extended with a valuation structure that describes how important is constraint is, or how costly violating it would be.

Task

The outcome of this thesis shall be a prototypical software solution for generating customized configurations with soft constraints and preferences. Hereby, the focus is on

- Analysis of existing techniques for modeling soft constraints
- Analysis of existing techniques for solving soft constraint-satisfaction-problems
- Development of a generic concept for generating configuration with soft constraints
- Development of a concept for introducing soft constraints to the INFIS training plan scenario
- Feasibility and practicality of the developed concept have to be proven in a prototypical implementation

All steps have to be carefully documented.
The Thesis has to be written in English

Prerequisites

- All prerequisites for a Master's Thesis
- Experience in .net / C# or in another OO programming language
- Interest in Artificial Intelligence

Supervisor

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