Pavel Surynek | Short Biography

Pavel Surynek is an assistant professor at Charles University in Prague, Czech Republic. He holds a Ph.D. in artificial intelligence and a master's in theoretical computer science from Charles University in Prague. He is responsible for teaching courses related to artificial intelligence. His main research interests include domain-dependent planning, constraint satisfaction, and Boolean satisfiability.

Talk 1

Global Consistencies in Boolean Satisfiability

Global consistencies known from constraint programming (CP) paradigm represent a powerful technique for search space pruning. They exploit knowledge about the entire problem being solved or about large parts of it in every single inference step. Considering that the problem is modeled using finite sets of variables and constraints in CP, this characterization means that the global consistency makes reasoning over large subsets of the set of variables simultaneously. Several attempts to interpret Boolean satisfiability (SAT) in terms of constraint programming have been made. However, these attempts are typically limited to a transfer of local consistencies to SAT. This talk will be devoted to a completely different approach. It will be shown how to develop a consistency directly for SAT with special regard on exploiting global knowledge about the problem within the consistency. A so called clique-consistency and global version of path-consistency will be described.

Talk 2

Path-planning for Multiple Robots

The problem of multi-robot path planning consists in constructing a sequence of moves for each robot of the group of robots that are moving in certain environment. It can be regarded as an abstraction for many practical tasks ranging from navigation of a group of robots to container rearrangement in storage yards. Initially, each robot is placed in some location in the environment and it needs to go to a given goal location. Robots must avoid obstacles and must not collide with each other along the process of relocation according to the constructed sequences of moves. An abstraction where the environment is modeled as an undirected graph is adopted. A solving algorithm called BIBOX will be shown. This algorithm is designed to solve a special but very common case of the problem where the graph modeling the environment is bi-connected. Several complexity results for the problem of multi-robot path planning will be shown as well. Particularly, it will be shown that optimizing the makespan of the constructed sequence of moves is intractable (namely NP-hard).