Discrete Optimization for Agents

Professor Peter J. Stuckey
Data 61 and University of Melbourne, 3010, Australia
pstuckey@unimelb.edu.au

ABSTRACT

Many an agent needs to make a decision of what do to given a limited amount of resources. This is a discrete optimization problem. Recent advances in discrete optimization modelling technology have made it easier than ever before to model difficult ad hoc optimization problems, and apply off the shelf solving technology rapidly and efficiently, while rapid advances in discrete optimization solving technology have made it faster than ever before to solve such problems. In this talk I will illustrate how

- modern languages allow us to capture the combinatorial substructure of discrete optimization problems thus allowing solving to be much more rapid;
- how nogood learning can exponentially improve our ability to solve these problems;
- and how these combine to allow us to rapidly resolve problems that are slowly changing, a case that seems particularly relevant to agents readjusting their plans in a changing environment

My hope is that the agent community will be inspired to learn and use more of the tools and techniques developed by the discrete optimization community.

CCS Concepts

•Mathematics of computing → Discrete optimization; •Theory of computation → Constraint and logic programming; •Hardware → *Theorem proving and SAT solving;*

Keywords

Discrete optimization; nogood learning; lifelong learning

Short Bio

Peter J. Stuckey is a Professor in the Department of Computing and Information Systems at the University of Melbourne, and project leader at NICTA and Data61. Peter Stuckey is a pioneer in constraint programming, the science of modelling and solving complex combinatorial problems. His research interests include: constraint programming; programming languages, in particular declarative programing languages; constraint solving algorithms; bioinformatics; and constraint-based graphics. He enjoys problem solving in any area, having publications in e.g. databases, timetabling, and system security.

Peter Stuckey received a B.Sc and Ph.D both in Computer Science from Monash University in 1985 and 1988 respectively. In 2009 he was recognized as an ACM Distinguished Scientist. In 2010 he was awarded the Google Australia Eureka Prize for Innovation in Computer Science for his work on lazy clause generation. He was awarded the 2010 University of Melbourne Woodward Medal for most outstanding publication in Science and Technology across the university.

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