Using and Developing Declarative Languages for Machine Learning and Data Mining

Luc De Raedt

Department of Computer Science, Katholieke Universiteit Leuven, Belgium
(*e-mail:* `luc.deraedt@cs.kuleuven.be`)

Abstract

Following a general trend in artificial intelligence, the fields machine learning and data mining have recently witnessed a growing interest in the use of declarative techniques. What is essential in this paradigm is that the user be provided with a way to declaratively specify what the problem is rather than having to outline how that solution needs to be computed. This corresponds to a model + solver-based approach in which the user specifies the problem in a high level modelling language and the system automatically transforms such models into a format that can be used by a solver to efficiently generate a solution. This should be much easier for the user than having to implement or adapt an algorithm that computes a particular solution to a specific problem. Therefore, declarative methods could have a radical impact on the fields of machine learning and data mining.

In this talk, I shall report on this new trend in machine learning and data mining from two different perspectives. The first is that of a user of existing declarative methods such as constraint programming and answer set programming, where I shall report on experiences, successes and challenges with using this type of technology. The second is that of a developer of declarative languages and solvers for machine learning and data mining, where I shall provide a gentle introduction to different types of languages such as inductive query languages, which extend database query languages with primitives for mining and learning, modelling languages for constraint-based mining, and probabilistic and other programming languages that support machine learning.