

Course Name

Decision Support, Optimisation and MiniZinc

Justification of Proposal

Over 50% of companies surveyed by an IBM-Sloan study indicated that analytics was a top priority in their organisation. The study divided analytics into three phases. The “aspirational” phase was around query, reporting and analysis. In the “experienced” phase, data mining, and business rules emerge as a central decision support tools. The “transformed” phase deploys optimisation to manage what to do and when to do it. NICTA’s optimisation research group has developed an optimisation platform which supports the modelling language MiniZinc, and maps it down to a variety of underlying algorithms known as “solvers”. This course provides an introduction to decision support and optimisation, introducing MiniZinc and discussing some of the underlying solvers.

Consultation Process

None to date. This proposal is based on a unit delivered to Monash Business Information Systems students in 2011.

Load – Hours per week

The short course will comprise the first four weeks of the Monash unit, comprising 8 hours of lectures and 8 hours of self-directed laboratory work.

Course Description

This course provides an introduction to decision support systems, with a narrow focus on combinatorial optimisation. After an introduction to decision support, with some practical examples, we will discuss problem modelling, and the notion of algorithmic complexity. We will then introduce the MiniZinc language and illustrate its use in modelling a few example problems. Lastly we will survey four solvers: SAT, constraint propagation, linear programming and mixed integer programming, and compare their performance on some example problems.

Proposed teaching methods and assessment practices

The two days will be divided into morning lectures, with traditional PowerPoint slides, and afternoon exercises requiring students to scope some decision support problems, and to develop and run some MiniZinc models.

No assessment is planned.

Information Technology Requirements for Students

The students will have to bring their own laptop with Wifi capability and a working Web browser to view and download the lecture slides and exercises. Students will be asked to download the MiniZinc package from the NICTA website (it is freely available to academics and researchers).

Textbooks

The course is supported by lecture notes, which cover not only the course material but also further information about problem modelling, MiniZinc, network models and dealing with uncertainty. The G12 website also offers a wealth of material about MiniZinc, with many examples of MiniZinc models, as well as Zinc and the G12 platform.