Decision Support Methodologies (G54DSM)

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Module Introduction

Dr Rong Qu
An Overview of 1st Week’s Content

- Module introduction
  - Aims of the module
  - Module content
  - Module schedule
  - Teaching methods
  - Textbooks + useful readings
  - Coursework assessment

- What are
  - decision making
  - decision support systems
Module Content

- This module introduces a wide range of advanced concepts, methods and techniques of Operational Research and Artificial Intelligence that can help in design of intelligent decision support systems.

- The module will present a variety of examples of intelligent decision support systems from industrial and service sectors.
Module Aims

- To provide a sound understanding of the advanced *Operational Research* and *Artificial Intelligence* methods

- Students will understand the methods and techniques that are available as aid in decision making

- Students will be acquainted with a number of applications from a variety of industrial and service sectors and will understand how software packages are designed to solve them
Module Learning Outcomes

- **Knowledge and understanding**
  - how to *model* a range of real-world problems suitable for analysis by OR and AI methods
  - a range of advanced OR and AI methods and their applicability to a variety of real-world decision making problems

- **Intellectual Skills**
  - The ability to understand complex ideas and relate them to specific situations

- Communicate results using appropriate styles, conventions and terminology
Module Learning Outcomes

- **Professional Practical Skills**
  - The ability to evaluate available OR and AI methods and select those appropriate to a given task

- **Transferable Skills**
  - On completion the students should understand the fundamental issues behind the development of intelligent decision support systems in different industrial and commercial sectors
Target Students & Module Requisite

- Postgraduate students registered for the following Masters degrees
  - Advanced Computing Science
  - Scientific Computation and Computational Finance
  - Available to JYA/Erasmus students

- Considerable knowledge and experience in computer programming
  - for the implementation of intelligent decision support systems - coursework
  - Excel VBA, C++, Java, Modelling using Excel
Course Context

- Related modules in CS
  - G54HSM Heuristic Search Methods
  - G53DSM Decision Support Methodologies
  - G53ORO Operations Research and Optimisation
  - G53KRR Knowledge Representation and Reasoning
  - G53DIA Designing Intelligent Agents
  - G52AIM Artificial Intelligence Methods
Module Resources

- **G54DSM Web Page**
  - http://www.cs.nott.ac.uk/~rxq/g54dsm.htm
  - All lecture slides and additional notes
  - Coursework (provisional: already available!)
  - Textbooks
  - Course schedule (might be adjusted)

- Feedback and Q&A to module list
  g54dsm@cs.nott.ac.uk
Teaching Methods

- Lectures: approx. 12 hours; Tuesdays 3-4pm
  - A range of DS methodologies
  - Invited lectures

- Seminars: approx. 10 hours; Mondays 1-3pm
  - Real world DSS applications
  - Presentations of prototype DSS from the class + feedback

- Private study: approx. 20 hours
  - Other possible OR/AI techniques
  - Literature of OR/AI techniques on DS problems
Module Assessment

- 100% on coursework

- Interim report (25%) - 19th Mar 2009, 15:30pm
  - Decision support problem, techniques and literature

- Final report (50%) - 30th April 2009, 15:30pm
  - Design and implementation of your prototype DSS

- Presentation (25%) - As scheduled after Easter
  - 20 minutes + 10 minutes from the class
Textbooks

- **Decision support systems and business intelligent systems (Turban et al.), 2008**

The 5\textsuperscript{th} edition available from the library
Comprehensive textbook in DSS
Part of the module material is from this book
Knowledge-based Decision Support Systems, With Applications in Business (Klein and Methlie), 1995

integrates expert system technology with decision support technology
comprehensive, knowledge-based decision support systems for a business-oriented audience
Reading Materials

- **Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques** (Burke & Kendall eds.), 2005

State-of-the-art tutorial text of the main search and optimization methodologies across OR and AI
Reading Materials

- **Artificial intelligence: a guide to intelligent systems.** (Negnevitsky), 2002

  Good AI textbook
  Easy to read while in depth
Lecture Schedule

- Part I: Decision Support Methodologies (Dr Rong Qu)
  - Module Introduction & Decision Support Systems
  - Modeling and Analysis
  - Data Management
  - Expert Systems
  - Case Based Reasoning
  - Multi-objective Techniques
  - Examples of DSS Techniques
Lecture Schedule

Part II: Real World Decision Support Systems (Prof. Edmund Burke)

- Decision Support Systems at Heathrow Airport
- Nurse Rostering Systems at Hospitals
- Stock Cutting and Packing
- EventMAP: Educational Timetabling System
- Hyperheuristics in DSS
Lecture Schedule

Part III: Demonstrations of DS Applications (Dr Rong Qu)

- Presentations of DS problems
- DSS presentations from the class
- Seminar discussions of DS techniques
- Feedback on interim reports and presentations