

QR 2016 – Programme

Monday, July 11th, 2016

08.30 – 08.45 *Welcome + Opening*

08.45 – 09.30 Invited talk (abstract below) (*Chair: Matthew Klenk*)

- Qualitative spatial reasoning: from calculi to applications – Diedrich Wolter

09.30 – 10.30 Session 1 (3 papers, 20 min each) (*Chair: Kamal Kansou*)

- Reconciling function and structure in scientific models – Scott Friedman, Mark Burstein, David McDonald, James Pustejovsky, Peter Anick, Rusty Bobrow and Brent Cochran
- Preparing MILA for college – Ashok Goel, David Joyner and Taylor Hartman
- Assessing learner-constructed conceptual models and simulations of dynamic systems – Bert Bredeweg, Jochem Liem and Christiana Nicolaou

10.30 – 11.00 *Break (coffee)*

11.00 – 12.15 Session 2 (5 papers, 15 min each) (*Chair: Bert Bredeweg*)

- How much qualitative reasoning is required in elementary school science test questions? – Max Crouse and Kenneth Forbus
- Challenges in formulating explanatory models for co-morbidities – Matthew Klenk, Marzieh Nabi, Adam Arvay, Daniel Bobrow and Johan de Kleer
- Structuring the domain knowledge for model-based decision support to water management in a peri-urban region in India – Peter Struss, Franziska Steinbruch and C. Woiwode
- From qualitative absolute order-of-magnitude to the extended set of hesitant fuzzy linguistic term sets – Jordi Montserrat-Adell, Monica Sanchez, Francisco Javier Ruiz and Nuria Agell
- Towards a qualitative descriptor for paper folding reasoning – Zoe Falomir

12.15 – 14.00 *Break (lunch)*

14.00 – 15.00 Session 3 (3 papers, 20 min each) (*Chair: Matthew Klenk*)

- Hole in one: using qualitative reasoning for solving hard physical puzzle problems – Xiaoyu Ge, Jae Hee Lee, Jochen Renz and Peng Zhang
- Unified approach to qualitative motion planning in dynamic environments – Domen Šoberl and Ivan Bratko

- Collaborative communication of qualitative spatial perceptions for multi-robot systems - Danilo Perico, Reinaldo A. C. Bianchi, Paulo E. Santos and Ramon Lopez de Mantaras

15.00 – 15.30 Sessions 4 (2 papers, 15 min each) (*Chair: Matthew Klenk*)

- QSRLib: a software library for online acquisition of qualitative spatial relations from video – Yiannis Gatsoulis, M Alomari, C. Burbridge, C. Dondrup, P. Duckworth, P. Lightbody, M. Hanheide, N. Hawes, D. C. Hogg and A. G. Cohn
- Eclipse in occlusion: a perspectival mereotopological representation of celestial eclipses – Paulo E. Santos, Roberto Casati, Hannah Dee, Carl Schultz and Mehul Bhatt

15.30 – 16.00 Break (*coffee*)

16.00 – 17.00 Session 5 (3 papers, 20 min each) (*Chair: Bert Bredeweg*)

- On the use of qualitative deviation models for diagnosis – Franz Wotawa
- Testing scientific models using a QR model: Application to cellulose biodegradation – Kamal Kansou and Bert Bredeweg
- Using qualitative reasoning to evaluate performance: An application in the retail sector – Xari Rovira, Nuria Agell, Josep M. Sayeras and Monica Sanchez

17.00 – 17.30 Reflection & Future plans

Abstract

Qualitative Spatial Reasoning: From Calculi to Applications – Diedrich Wolter

The qualitative spatial reasoning community investigates abstract representations of spatial knowledge. Research in this area draws motivation from several general aims, for example to gain an understanding of fundamental computational principles, to capture the catalog of cognitive concepts in a computational framework, or to provide useful techniques to applications. So far, research has led to the development of well over 40 formalisms, widely called qualitative spatial calculi. This wealth results from the diversity of potentially useful spatial concepts and computational challenges faced -- designing expressive yet computationally feasible formalisms is a delicate balancing act that often requires some trade-offs. While we have reached a good level of understanding computational aspects of spatial reasoning, how far have we come with respect to our other aims?

In this talk I adopt an application-oriented perspective and examine the contribution of qualitative spatial reasoning techniques. Looking at selected applications broadly related to intelligent service robots, I review the beneficiaries of employing qualitative spatial representation and reasoning. I argue that employing qualitative concepts requires reasoning to implement semantics. However, not all required reasoning techniques are available so far. In this talk I present some case studies which already demonstrate the utility of qualitative spatial reasoning. Additionally, I identify important challenges on the way to qualitative spatial reasoning becoming an integral part of any intelligent service robot.