

## Special issue on “Qualitative Spatial Reasoning”

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### Preface

In contemporary parlance, qualitative reasoning can be regarded as reasoning about physical systems by exploring their structural properties. Qualitative spatial reasoning, in particular, aims to express non-numerical relationships among spatial objects based on relations such as “in contact with” and “part of”. Its roots include the region-based theories of space of de Laguna [1] and Whitehead [5], the “sensible geometry” of Nicod [3], the ontology and mereology of Leśniewski [2], and the geometry of solids proposed by Tarski [4]. In this double issue, we present examples of the breadth and depth of current research in qualitative spatial reasoning, covering its constituent fields geometry, topology, algebra, and logic.

Following an overview of current qualitative spatial representation and reasoning techniques by A.G. Cohn and S.M. Hazarika, metrics to define continuous change of shape are presented and investigated by E. Davis, and A. Galton explores the concept of dominance between qualitative states. The task of describing and working with incomplete knowledge about regions is taken up in the contributions by I. Düntsch, E. Orłowska and H. Wang who present an algebraic framework for approximating regions and relations among them, L. Polkowski who widens Leśniewski’s mereology by including components from rough set theory, and T. Bittner who considers the nature of boundaries in the built environment. The final three contributions are logical in nature: D. Schoop explores the age-old dichotomy “regions vs points”, B. Bennett presents a powerful axiomatisation of region-based geometry, and, in a lively (and somewhat controversial) contribution, I. Pratt-Hartmann argues for a model-based approach to formulating region-based theories of space.

I would like to thank all authors for their contributions which paint a true picture of the current healthy state of qualitative spatial reasoning in all its various facets.

Ivo Düntsch