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Advances in Spatial and Temporal Reasoning

J.UCS Special Issue

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Qualitative spatial representation and reasoning has evolved as a sub-division in its own right within the broader field of Artificial Intelligence – recent years have witnessed remarkable advances in some of the long-standing problems of the field. For instance, new results about tractability for spatial calculi, explicit construction of models, and characterization of important subclasses of relations, as well as in the development of new areas such as the emergence of integrated spatio-temporal calculi and the use of non-monotonic techniques for dealing with various aspects intrinsic to modeling dynamic spatial systems.

Driven by cognitive approaches that characterize the processing of spatial information within qualitative spatial reasoning, there has been considerable influx of people from other areas within AI, working on qualitative representation and reasoning about spatial change, spatio-temporal interactions, the formal modeling of dynamic spatial systems in general, and the role of classical deduction and abduction for modeling spatial-temporal planning and causal explanation tasks in the context of qualitative spatial calculi. Inextricably linked to space is time, i.e., spatial configurations change over time. Spatial change may also be perceived as being spatio-temporal and a lot of recent work is being devoted to providing useful and well-grounded models to be used as high level qualitative description of spatio-temporal change. Reasoning about space essentially involves reasoning about changing spatial configurations, and in more realistic scenarios, integrated reasoning about space, actions and change. Recent work supporting this paradigm has explicitly addressed the potential interactions between the spatial reasoning domain and the field of reasoning about actions and change & commonsense reasoning – explicit links between some of the epistemological issues relevant to the frame, ramification and qualification problems have surfaced in modeling of dynamic spatial knowledge.

For this special issue, we invited original contributions reporting new theoretical advances related to any of the above aspects of spatial and temporal reasoning, construction of new spatial calculi that serve application-specific needs, the formal modeling of dynamically varying spatial knowledge, the role of commonsense reasoning and non-monotonic forms of inference in a spatial context, and techniques and tools that are consistent with standard results within the community from an ontological and

computational viewpoint. With its focus on theoretical results, it complements another special issue on "Emerging Applications of Spatial and Temporal Reasoning" that has been published within the Journal of Spatial Cognition and Computation in 2010. Together, both special issues have been conceived with the aim to build on the results of thematically complementing events/workshops that have been organized at different venues, and with a different focus, in 2009.

After a thorough reviewing process, we finally decided to accept the five papers that you can find in this issue. Two of the papers deal with spatial issues, another two with temporal ones, and one paper addresses both space and time. We hope that you find this limited selection as inspiring as we do, and that it encourages you to actively engage in research in the exciting field of spatio-temporal reasoning.

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