

The Power of Space and Time – how spatial and temporal structures can replace computational effort

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Abstract

Spatial structures determine the ways we perceive our environment and the ways we act in it in important ways. Spatial structures also determine the ways we think about our environment and how we solve spatial problems abstractly. When we use graphics to visualize certain aspects of spatial and non-spatial entities, we exploit the power of spatial structures to better understand important relationships. We also are able to imagine spatial structures and to apply mental operations to them. Similarly, the structure of time determines the course of events in cognitive processing. In my talk I will present knowledge representation research in spatial cognition. I will demonstrate the power of spatial structures in comparison to formal descriptions that are conventionally used for spatial problem solving in computer science. I suggest that spatial and temporal structures can be exploited for the design of powerful *spatial computers*. I will show that spatial computers can be particularly suitable and efficient for spatio-temporal problem solving but may also be used for abstract problem solving in non-spatial domains.

Short Biography

Christian Freksa holds the Chair of Cognitive Systems at the Faculty of Mathematics and Informatics at the University of Bremen, Germany. His research concerns representation and reasoning with incomplete, imprecise, lean, coarse, approximate, fuzzy, and conflicting knowledge about physical environments. Particular emphasis is on qualitative spatial and temporal reasoning. Freksa received a PhD in Artificial Intelligence from UC Berkeley. He carried out research at the Max Planck Institute and at the Technical University of Munich, at the International Computer Science Institute in Berkeley, and at the University of Hamburg. In 2002 he initiated the International Spatial Cognition Quality Network and the Spatial Cognition Research Center in Bremen and Freiburg that he has been directing since 2003. Christian Freksa is a Fellow of the European AI society ECCAI.