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.