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RCC as a tool for formal modeling spatial relations

In the present talk I define basic relations within the framework of Region Connection Calculus (RCC) (Randell, Cui, Cohn, 1992) regarding natural language expressions and exemplify and discuss them according to Latvian spatial expressions. Based on two primitive topological relations – connectedness and convex hull – I define a set of derived relations. (1) Connectedness allows defining relations of disconnectedness, external connectedness, partial overlap, equality, tangential proper part and non-tangential proper part. (2) Convex hull enables defining a partial geometric inclusion. Further, I introduce two additional relational primitives – orientation and distance – and argue that this, a slightly extended version of RCC, is sufficient for expressing static non-functional locative spatial information.

In the second half of my talk I show that RCC can be applied to the analysis of directional and dynamic information if additional functional primitives (support, locational control, interlocking, enclosure, telicity) are introduced. Therefore, a substantially modified version of RCC (i.e, RCC+) is briefly presented. The relevance and plausibility of the RCC-based formalism is supported by empirical evidence from experiments with Latvian. Thus, the current results enrich some previous studies on functional spatial relations by providing a simple formal background of some core relations (Coventry, Carmichael, & Garrod, 1994, Coventry & Garrod, 2004). In the context of the current results I also discuss the compatibility with and consequences for qualitative reasoning and knowledge representation (Mani & Pustejovsky, 2012). Finally, I argue that an extended model of RCC is compatible with approaches representing force dynamic relations (Talmy, 1988, Gärdenfors, 2014).

References

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