

Qualitative Spatial Change in Mereotopology

Shyamanta M. Hazarika
School of Engineering, Tezpur University
Tezpur

Cognitive agents need to have *representation of knowledge* of their spatial environment to *reason* and *interact*. Space and time are inextricably linked. Reasoning about space often involves reasoning about change in spatial configurations. For any ‘commonsense’ theory of spatial representation and reasoning, preference needs to be for an *ontological primitive* of *space-time* rather than *space* alone! Everyday reasoning involving spatial and temporal attributes is driven through *qualitative abstractions*. Hence, ‘commonsense’ theories of spatial change for *cognitive agents* need to be *qualitative* rather than *quantitative*.

There are many other dimensions of change viz. change in shape, location etc. Notions of spatio-temporal continuity hold a key. Even though *continuity* is basic to our understanding of physical processes and change, it remains an implicitly assumed notion within *Qualitative Spatial Reasoning*. The work described here is concerned with developing a *mereotopological* spatio-temporal theory based on space-time histories; and formalizing an intuitive notion of spatio-temporal continuity for a *Qualitative Theory of Spatial Change*.

Within the *mereotopological* theory a framework for *abducing* qualitative world model from *partial* observations (as may be sensed by a mobile *robot*) is formulated. In general, abductive reasoning may yield more than one possible explanation and is accompanied by some preference criteria expressed through *heuristics*. Here the abductive technique of *circumscription* is used to implement the heuristic of *inertia* i.e., changes should occur only when forced to.