

Commonsense Spatial Reasoning: from Pervasive Computing to a Philosophical Perspective

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Abstract

Pervasive Computing has become a very important topic in Computer Science. A particularly strong relationship holds among pervasive systems and the spatial environment they habit. Various kind of reasoning tasks that must be carried out by these systems need to take into account a spatial model of the environment in order to exploit spatial information to draw domain specific inferences.

In order to support spatial reasoning in the Pervasive Computing area, this paper presents a Commonsense Spatial Model that focuses on the notions of "place" and "commonsense spatial relation". Some philosophical issues concerning the concept of place and of commonsense spatial relation will be discussed. In particular, three main classes of relations (Orientation, Proximity and Containment) will be defined and formally analysed.

The commonsense spatial model essentially consists of a relational structure and, therefore, it can be viewed as the semantic specification for a Hybrid Modal Logic, according to traditional kripkean possible worlds semantics.

The proposed commonsense approach to spatial reasoning will be put in relationship with some philosophical observations about the notion of space proper of the transcendental phenomenology of Edmund Husserl. We will argue that some husserlian intuitions are extensible to human artefacts, such as a pervasive systems, in order to justify a different approach to spatial reasoning, which focuses more on the representation of the space generated by the presence of the system in the environment, than on the representation of the morphological properties of the environment itself.