Chapter 65
OntoHealth:
An Ontology Applied to Pervasive Hospital Environments

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ABSTRACT

In the last years ontologies are being used in the development of pervasive computing applications. It is habitual their use for facilitating the interoperability among context-aware applications and the entities that may enter in the context at any time. This chapter presents OntoHealth: an ontology applied to health pervasive environment and a tool to its processing. The main idea is that a hospital could be seen as this pervasive environment, where someone, through ubiquitous computing, engages a range of computational devices and systems simultaneously, in the course of ordinary activities, and may not necessarily even be aware that they are doing so. With the proposed ontology and the tool for its processing, the medical tasks can be shared by all components of this pervasive environment.

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INTRODUCTION

The pervasive computing requires that the computational tasks must be aware of the adjacent environments and the user's needs, and besides, must be able to adapt themselves to them (Weiser, 1991). One of the main characteristics of pervasive computing is the context awareness (Loke, 2004).

Context is understood as any relevant information that can be used to characterize a situation of an entity. In turn, it is defined by the use of the environment characteristics, like the user's location, time and activity, to allow applications to adapt themselves to the different situations and provide relevant information to users. Thus, the information referring to the context should be related to the knowledge representation of the domain. One of the most appropriate ways of represent knowledge is through ontologies (Ye, Coyle, Dobson, & Nixon, 2007).

In ontologies, relationships are defined formally and the semantics of a given relationship is detailed. If these relationships have appropriate names that identify their meaning, a human can understand it directly, as well as a computer program can assume the semantics of a relationship and work systematically through it.

The process of building ontologies is not a trivial task, considering that for its definition, it is necessary a specialized knowledge about a specific domain to avoid any kind of ambiguity or retorts related to the validity of it. Therefore, this chapter has as main goal the construction of an ontology to describe the domain of a hospital that can be used for interaction between the entities in a pervasive environment, and the implementation of a system that allows its processing.

This chapter is divided as follows. The next section describes pervasive environments and ontologies. The following section describes the use of ontologies in pervasive environments. Section after that, presents OntoHealth: the ontology itself and its processing. The related and future works is presented before the conclusion.

PERVASIVE COMPUTING

Pervasive computing is a computing paradigm incorporated in a variety of devices (clothes, computers, cell phone, cars etc), which can carry out computing in a relatively non-intrusive manner and can impact and support many aspects of work and daily activities (Robinson, Wakeman, & Chalmers, 2008). It is the trend towards increasingly ubiquitous and connected computing devices in the environment which is being brought about by a convergence of advanced electronic – and particularly wireless – technologies and the Internet (Henricksen, Indulska, & Rakotonirainy, 2002).

Pervasive computing requires that computing tasks are aware of the surrounding environment and of the users' needs, and also capable of adapt to these. A fundamental concept of pervasive computing is context awareness (Abowd, 1999). Context is any relevant information that can be used to characterize a situation of an entity. It includes background information, specification of user and application requirements as well as any relevant quantifiable entities in the environment.

Pervasive Environments

A pervasive environment can be defined as an environment that contains a large number of computational devices interconnected, where their tasks must be aware of the current context and be able to adapt themselves to this context (Theng & Duh, 2008).

Context-aware computing is about systems that can understand context and intelligently adapt their behavior to suit a given situation (Saha & Mukherjee, 2003). This could means systems that know who you are (your role, your preferences, previous actions), know your location, what device you are using, what devices and other services are available to you; understand your environment, what you are doing, and possibly your emotional state and receptiveness to learning. Ultimately, it is about systems that can adjust themselves to the