Chapter IX

Memetic Approach to the Location-Based Ad Hoc Federation of Intelligent Resources

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Abstract

The current Web is a mine of tools and services and the gate to ubiquitous computing environments with a huge number of highly distributed mobile and embedded intelligent resources. Their advanced reuse in assistance systems that support whole processes of our tasks requires federation of resources, that is, both discovery of appropriate resources from a certain scope of resources, and their interoperation and coordination for the required demand. Such a scope and the demand may dynamically change. This chapter focuses on such cases in which both change dynamically, and the change of demand cannot be predicted. Assistance systems for such cases must be able to support us
to instantaneously perform federation of Web resources in an ad hoc way. They require new technologies for ad hoc federation of Web resources, and for restricting the scope of discovery in accordance with dynamically changing situations. This paper proposes the use of meme media technologies for ad hoc federation of intelligent resources over the Web. It also proposes the Wiki piazza architecture that works as a repository and lookup service, and combines this service with a location reference service to propose a way of restricting the scope of discovery using location-dependent contexts. These technologies enable location-based ad hoc federation of intelligent resources over the Web and ubiquitous computing environments.

**Introduction**

During the last decade, the Web has become a very rich gigantic mine of all kinds of multimedia documents on almost any kinds of topics and subjects, varieties of ready-to-run application tools, and almost any kinds of services. These services include information and database reference services, simulation services, map services, data conversion and analysis services, e-learning services, and metainformation services such as search engines. Today, you can mine the Web to obtain almost whatever information items, application tools, or services you may think of. The Web is becoming the primary source of information resources and intelligent resources including tools and services for assisting a huge variety of our tasks.

However, in practice, we are not yet able to fully utilize the rich variety of these resources over the Web in our daily tasks. A task in general consists of a set of subtasks among which a flow of information is defined. A task may change its information flow among subtasks depending on the input and output of each subtask. A task is atomic if it cannot be decomposed into subtasks. A task that can be performed by a tool or a service is an example of an atomic task. Tools and services can perform some atomic tasks for us. However, non atomic tasks cannot be performed by any tools or any services. Each non atomic task requires coordinated use of more than one tool or service. We need an assistance system to coordinate not only the access of more than one tool or service, but also the user’s interaction, to perform a task.

We are not yet able to fully utilize the rich variety of Web resources for assistance systems. There are three main difficulties in their reuse for assistance