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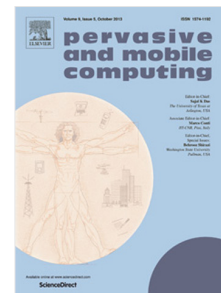
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A Model for Optimal Service Allocation in a Smart Environment

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Abstract

Ambient Intelligence (AmI) is a user-centric paradigm offering self-adaptive environments and tailor-made services. A fundamental component of an AmI environment is a service allocation system. In this paper, we present a mathematical model for service allocation in a multiagent-based AmI environment that exhibits heterogeneous resources and energy constraints. We also propose a heuristic, probabilistic search algorithm for efficiently solving the provisioning problem. Results show that our model achieves optimal service allocations that trade-off the number of services offered by the agents and their energy consumption, thereby reducing the overall response time of the AmI environment and its energy use.

Keywords: Ambient Intelligence, Service Allocation, Intelligent Agents, Multiagent Systems, Smart Environments

1. Introduction

AmI is a Computer Science field that integrates new research topics such as ubiquitous computing, intelligent interfaces, adaptive systems, Smart wireless sensor networks (WSNs), among others [1]. This field has emerged to improve human-machine interaction and to facilitate people's daily activities in applications such as smart homes, healthcare, and agriculture [2, 3, 4]. The goal of AmI is to provide environments that: respond to their users and adapt themselves to different types of situations. Notably, to fulfill such a goal, AmI must integrate the hardware and software devices interacting with users in a friendly and transparent manner. AmI has become a relevant research topic in recent years because of the challenges associated to the integration, in a transparent manner, of the aforementioned research topics [1, 5].

In order to provide different services to a smart environment, several factors have to work together in a coordinated fashion. These factors include the dynamic abstraction of the environment and its

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