

Smart Web Services in the Web of Things

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Abstract : The Web of Things (WoT), integration of smart technologies from the Internet or network to Web architecture or application, is becoming more complex, larger, and dynamic. The WoT is associated with various elements such as sensors, devices, networks, protocols, data, functionalities, and architectures to perform services for stakeholders. These services operate in the context of the interaction of stakeholders and the WoT elements. Such context is becoming a key information source from which data are of various nature and uncertain, thus leading to complex situations. In this paper, we take interest in the development of intelligent Web services. The key ingredients of this “intelligent” notion are the context diversity, the necessity of a semantic representation to manage complex situations and the capacity to reason with uncertain data. In this perspective, we introduce a multi-layered architecture based on a generic intelligent Web service model dealing with various contexts, which proactively predict future situations and reactively respond to real-time situations in order to support decision-making. For semantic context data representation, we use PR-OWL, which is a probabilistic ontology based on Multi-Entity Bayesian Networks (MEBN). PR-OWL is flexible enough to represent complex, dynamic, and uncertain contexts, the key requirements of the development for the intelligent Web services. A case study was carried out using the proposed architecture for intelligent plant watering to show the role of proactive and reactive contextual reasoning in terms of WoT.

Keywords : smart web service, the web of things, context reasoning, proactive, reactive, multi-entity bayesian networks, PR-OWL

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