A Semantic Cloud-based Knowledge Mediator for Smart Clinical Decision Support System

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Abstract. The evolution of the web and mobile applications as well as the proliferation of advanced medical devices underpins the digital healthcare data universe and its distribution. Providing personalized clinical decisions that meet the patient profile requires automatically integrating multiple reliable knowledge sources. However, the dynamicity, the heterogeneity and the distribution of these sources hamper the integration process. In this paper, we have proposed a semantic cloud-based knowledge mediator that allows integrating external knowledge sources independent of their knowledge representation and used syntax. To this end, the proposed architecture defines a common semantic representation of the knowledge sources' characteristics in order to dynamically adapt the queries and retrieve the appropriate knowledge from external sources. We have illustrated the efficiency of our proposed architecture through a diabetes scenario considering comorbidity condition.

1 Introduction

The integration of Information Technology (IT) in the healthcare sector fosters the remote access to healthcare services and accelerate the delivery of care. It has proven efficiency in managing chronic diseases, engaging the patient in the care process, and improving outcomes. However, according to the World Health Organization (WHO), the number of patients with chronic disease keeps growing (Abegunde and Stanciole, 2006). Thus, early and systematic interventions are highly recommended to prevent health complications and reduce the disease spread. Medical prevention requires continuously monitoring the patient health and providing advanced mechanisms that predict if health complications may occur.

New generation of healthcare technologies including wearable devices contribute to enhancing the quality of life (Park and Jayaraman, 2003) by providing real-time data collection pertaining to the patient health and behavior. Emerging these personal technologies help accelerating and improving the healthcare and economic outcomes. Likewise, advances in internet and web technology have been exploited in healthcare to make an increasing quantity of information sharable and reusable by the healthcare practitioners. Many reliable healthcare distributed knowledge sources such as drugbank, sider effect and clinical trials are being