

LinkedUp - Linking Web Data for Adaptive Education

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Abstract. Linked Data principles allow for easy discovery, reference, access and reuse of Web data. The user modeling community already widely exploits Semantic Web technologies, but the Linked Data approach is still not widely adopted. The LinkedUp project aims to advance the exploitation of open data on the Web, particularly for education. In this paper, we discuss the relevance of Linked Data for user modeling and personalization, and how to participate in and profit from the various initiatives of LinkedUp.

Keywords: LinkedUp Project, Linked Data, Learning Analytics, Personalization, Technology-Enhanced Learning

1 Introduction

Adaptive systems typically make use of techniques from the fields of information retrieval, machine learning, data mining and recommender systems to provide information and functionality that matches the user preferences, interests and requirements. The effectiveness of these techniques highly depends on the quality and quantity of available data about the resources and about the users.

Semantic Web technologies are often used in order to solve interoperability issues. However, even though the Linked Data approach [6] has established itself as the de-facto standard for sharing data on the Semantic Web, adoption by the UMAP community has remained limited.

In this paper, we give a brief introduction to Linked Data and its relevance for user modeling and personalization in general, and for adaptive educational systems in particular. Further, we present the LinkedUp project and discuss how the user modeling community can benefit from its activities.

2 Linked Data in a Nutshell

The simplest way to describe Linked Data [6] is that it is about using the Web architecture not only for documents, but also for data. The foundation of Linked Data is that data objects on the Web are identified by Web addresses (URIs),

which can be referenced by a Web link, similarly as one would do with Web documents. This basic principle for easy discovery, reference, access and reuse of Web data is now gaining significant momentum in many different areas.

Governments (most notably in the US³ and the UK⁴) are leading open data initiatives; they provide information about aspects such as transport, environment, public spending and education. In addition, various more general-purpose datasets are being made available, such as the Geonames initiative⁵, which makes it possible to exploit information on geographical places in the world. One of the most referred to sources of open Web data is DBpedia⁶, a Linked Data version of Wikipedia. Finally, Linked Data is more and more used by universities and other education institutions (see [1] and [2] for details). These various initiatives make the Web of Linked Data an invaluable resource that connects and gives access to information from an incredibly vast number of domains.

3 Relevance for Personalization

There are various examples of research on adaptive service selection and composition for personalization in the UMAP community. [7] discuss how semantically rich descriptions of available services complement manual composition and AI planning techniques. The Personal Reader [4] is an example system that employs Semantic Web technologies for extending personalization to resources from external repositories. A more recent paper [3] presents a proof of concept on how linked data principles and service-orientation resolve the integration issues for sharing and discovering educational resources.

Linked data is also considered a base technology for the integration of data for (educational) data mining, and gains increasing attention in the Learning Analytics community⁷, which focuses on the measurement, collection, analysis and reporting of data about learners and their contexts, for understanding and optimizing learning and the environments in which it occurs [5].

4 The LinkedUp Project

The LinkedUp project⁸ is an FP7 Support Action that pushes forward the exploitation and adoption of open data available on the Web, in particular by educational institutions. To address these goals, LinkedUp provides a range of activities, including the LinkedUp Data Challenge⁹. The goal of the Challenge is to identify and promote innovative applications and tools that exploit large-scale

³ <http://www.data.gov/>

⁴ <http://data.gov.uk/>

⁵ <http://www.geonames.org/>

⁶ <http://dbpedia.org/>

⁷ As illustrated by the Learning Analytics and Linked Data Workshop at LAK 2012

⁸ <http://linkedup-project.eu/>

⁹ <http://linkedup-challenge.org/>

Web data in educational scenarios. An important focus of the challenge will be on adaptive service selection and other personalization techniques.

To support the challenge, the LinkedUp support action collects and catalogs data explicitly related to education, as well as related data that may be relevant, including useful Web media, user-generated content, Web lectures or academic publications. The data is made available through the Linked Education catalog¹⁰ as well as through a data endpoint¹¹, where a SPARQL endpoint provides access to VoID¹² descriptions of currently included datasets.

5 Summary and Outlook

There is a wealth of useful material on the Web that can be used in education, ranging from slides, tutorials and online courses to Wikipedia articles and YouTube videos. The LinkedUp challenge aims to find ways to link and mash up educational and cross-domain linked and open data to provide novel applications for education. LinkedUp will catalog and curate open Web data, and create a reusable evaluation framework for Open Web Data applications, in particular in the educational domain. In addition, LinkedUp collects applications and use-cases that will help the education sector to capitalize on open Web data.

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References

1. d’Aquin, M., Adamou, A., Dietze, S.: Assessing the educational linked data landscape. In: Proceedings Web Science (2013)
2. Dietze, S., Sanchez-Alonso, S., Ebner, H., Yu, H.Q., Giordano, D., Marenzi, I., Nunes, B.P.: Interlinking educational resources and the web of data a survey of challenges and approaches (2013)
3. Dietze, S., Yu, H.Q., Giordano, D., Kaldoudi, E., Dovrolis, N., Taibi, D.: Linked education: interlinking educational resources and the web of data (2012)
4. Dolog, P., Henze, N., Nejd, W., Sintek, M.: The personal reader: Personalizing and enriching learning resources using semantic web technologies. In: Adaptive Hypermedia and Adaptive Web-Based Systems. pp. 85–94. Springer (2004)
5. Ferguson, R.: The state of learning analytics in 2012: A review and future challenges. Knowledge Media Institute, Technical Report KMI-2012-01 (2012)
6. Heath, T., Bizer, C.: Linked data: Evolving the web into a global data space. Synthesis lectures on the semantic web: theory and technology 1(1), 1–136 (2011)
7. O’Keeffe, I., Conlan, O., Wade, V.: A unified approach to adaptive hypermedia personalisation and adaptive service composition. In: Adaptive Hypermedia and Adaptive Web-Based Systems. pp. 303–307. Springer (2006)

¹⁰ <http://datahub.io/group/linked-education>

¹¹ <http://data.linkededucation.org/linkedup/catalog/>

¹² <http://www.w3.org/TR/void/>