LinkedUp Vidi Competition: Linked and Open Data for Education

Mathieu d'Aquin[1], Stefan Dietze[2], Hendrik Drachsler[3], Marieke Guy[4], Eelco Herder[2]**

[1] Open University, UK
m.daquin@open.ac.uk
[2] L3S Research Center, Germany
dietze, herder@L3S.de
[3] Open Universiteit Nederland
Hendrik.Drachsler@ou.nl
[4] Open Knowledge Foundation, United Kingdom
marieke.guy@okfn.org

Abstract. Linked Data is a set of well-defined principles for sharing of large datasets on the Web. The huge success and widespread adoption of the Linked Data approach has led to the availability of vast amounts of public data such as DBpedia, WordNet RDF or the data.gov.uk initiative. The LinkedUp Vidi Competition, organised by the LinkedUp Project, is the second in a series of three competitions on tools and demos that analyse or integrate open web data for educational purposes.

1 Introduction

The Semantic Web has redefined itself throughout the last years as a Web of 'Linked Data', by establishing principles that support sharing of large datasets on the Web together with a technology stack - fundamentally based on the use of URIs, RDF, and SPARQL - aimed at facilitating these principles.

The huge success and widespread adoption of the Linked Data approach has led to the availability of vast amounts of public data such as DBpedia[1], WordNet RDF[2] or the data.gov.uk initiative[3]. More recently, these approaches started to get adopted by education institutions, with Linked Data technologies being used to expose public information regarding course offerings, open educational resources and educational facilities in a readily accessible and reusable way. While the very nature of the Linked Data approach thus clearly offers promising solutions that can potentially transform education, it is not yet adopted widely within the educational field.

** Authors listed in alphabetical order
[1] http://dbpedia.org/
[2] http://www.w3.org/TR/2006/WD-wordnet-rdf-20060619/
[3] http://www.data.gov.uk

2 LinkedUp Project

The LinkedUp project[4] is an FP7 Support Action that seeks to explore and exploit open and linked data for education. This includes data with an explicit educational purpose, as well as other data and information that may not have an explicit educational merit, but can usefully be applied to an educational context.

LinkedUp conducts activities, including the establishment of three competitions and a corresponding evaluation framework. The latter will provide a general framework for evaluating all aspects of open Web data-driven applications. All activities aim at identifying and promoting innovative success stories that exploit large-scale Web data in educational scenarios as part of robust applications and tools.

Additional dataset curation activities are resulting in a repository and catalog of well-described and assessed datasets, which will support participants of the challenge, as well as interested data consumers and application developers in general. In addition, suitable use cases are being collected by the LinkedUp consortium and associated organizations.

3 LinkedUp Vidi Competition

The LinkedUp Vidi competition is the first edition of three consecutive competitions (Veni, Vidi and Vici). Vidi was open to anyone around the world who likes mashing up data or creating new and interesting tools and applications. We specifically targeted researchers and practitioners from both the eLearning area as well as the semantic technologies field.

Participants were invited to submit their Web application, App, analysis toolkit, documented API or any other tool that connects, exploits or analyses open or linked data and that addresses real educational needs. The Vidi competition featured an open track and two focused tracks, Pathfinder and Simplificator. The open track invited submissions on any demo or prototype for educational purposes. Pathfinder called for applications easing access to recommendations and guidance when choosing appropriate curriculum of courses and related resources. Simplificator asked for applications easing access to complex information by summarizing them in a simpler form. Full details of the Vidi competition can be found on the competition Website[5].

To support the competition, LinkedUp collected and cataloged 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 catalog[6] as well as through a data endpoint[7], where a SPARQL endpoint provides access to VoID[8] descriptions of currently included datasets.

[4] http://linkedup-project.eu/
[5] http://linkedup-challenge.org/
[6] http://datahub.io/group/linked-education
[7] http://data.linkededucation.org/linkedup/catalog/
[8] http://www.w3.org/TR/void/

4 Shortlisted submissions

The Vidi competition received fourteen submissions with innovative ideas in areas such as agriculture, arts and medicine. Our evaluation panel considered many aspects of the entries, including innovation, attractiveness and usefulness. They also looked at the relevance for education, the usability and performance of the tools, the data the entry uses or provides, and the way privacy and other legal aspects are dealt with. We accepted seven submissions for the open track and two submissions for Simplificator. The titles and abstracts of these papers - with links to the online demos - are presented below.

4.1 Open Track

AGRIS exploiting bibliographic records to create rich Linked Open Data page

Fabrizio Celli
Food and Agriculture Organization of the United Nations (FAO) (Italy)

AGRIS is a lot of things; it is a network, a website, a search engine. But AGRIS is also a database, a collection of more than 7.6 million bibliographic references in the agricultural domain. Most of these references are enhanced by the Agrovoc thesaurus and this is very important, since Agrovoc is the magic which allows AGRIS to automatically read specific data sources from the Web. AGRIS serves a million pages a month, with more than 350,000 users accessing the system every month. AGRIS is also an RDF-aware system, but for the end user it is simply a single entry point to the information in the agricultural domain. This does not mean that AGRIS will centralize all the information in agriculture, but it relies on a central repository and, using a distributed approach, it can access external data sources. What we want to show to the user is the bibliographic record together with a lot of other meaningful information about the topic of the record. This information must be automatically extracted from the Web (using LOD technologies): here comes Agrovoc, which gives semantic meaning to records and can be used to query external sparql endpoints or webservices to get information.

Demo: http://agris.fao.org/agris-search/index.do

DBLPXplorer: Interactive Graphical Interfaces for the Computer Science Bibliography

Ricardo Kawase, Ujwal Gadiraju and Patrick Siehndel
L3S Research Center & Leibniz Universitt Hannover (Germany)

Every year thousands of new research works are indexed and published online. Scientific publications involve mainly two sets of actors; namely, authors and articles. Consequently, a huge tangle of relations emerge together, where authors collaborate with several other authors and articles reference past literature. Due to this complex network, keeping up to date with the latest research in a particular field is often a time consuming task. Currently, available tools to

explore such information are solely text based. The information seeker has to search, browse and navigate page by page in order to find relevant research. Yet, one cannot harness an overview of underlying networks and connections. At the same time, there is an abundance of information in the form of nearly disjoint datasets relevant to research and the actors involved in the Linked Open Data cloud. To facilitate the exploration of authors, scientific research and relations, we propose a visual exploratory interface for DBLP Computer Science Bibliography. To further enrich the data we extract authors keywords from the articles and additionally annotate each article with identified DBPedia entities. The presentation layer consists of several user friendly exploratory interfaces that utilize state of the art javascript library D3 (Data-Driven Documents). Our interfaces include overview of particular venues, authors profiles, scientific articles, relations and a knowledge base of keywords and semantic annotations. To complete our work, we expose all the enriched data as linked data.

Demo: http://www.l3s.de/ kawase/DBLPXplorer/

Konnektid Social Learning Anytime, Anywhere

Michel Visser, Simone Potenza and Romee Houben
Konnektid (Netherlands)

Konnektid offers peer to peer learning by enabling you to find skilled people nearby. Social Learning Anytime, Anywhere. We are reinventing education with a high social impact. Imagine you can find learnings right around the corner and meet your teacher right away, just by asking around. By sharing your skills with the people around you, we enable you to help yourself and others grow while getting to know the people nearby. One on one, personal and local. People everywhere are walking around with useful skills and knowledge. Unfortunately, all that juicy information is too often inaccessible. What a waste! Konnektid helps you crack open their minds to expand your own.

Demo: http://www.konnektid.com

LODStories: Learning About Art by Building Multimedia Stories

*Jianliang Chen, Yuting Liu, Dipanwita Maulik, Linda Xu, Hao Zhang, Craig A. Knoblock, Pedro Szekely and Miel Vander Sande**
*University of Southern California (US) and * Ghent University (Belgium)*

LODStories is an engaging application where people learn about art while constructing multimedia stories about art and its connections to the people, places and ideas. LODStories mines the Linked Open Data cloud to discover interesting connections between entities that people are familiar with and artworks, artists and places. LODStories guides users to construct a storyboard that connects the entities in an interesting way. It then fetches text, images and videos that users can arrange to create a multimedia story, and finally constructs a narrated video that users can edit and then publish to tell their story. The process is fun, and students learn about art and its connection to the world they live in. The paper describes the architecture of the system and the algorithms to make the exploration entertaining and educational.

Demo: http://goo.gl/XIZhbJ

Rhizi.net

Dor Garbash, Eyal Rotbart%, William Zeng+, Brendan Fong+, Erik Edstrom+, Jacob Cole+, Calvin Fong=, Yael Ben Dov%*
** CRI (France), % Rhizi.net (France), + Oxford University (UK), = Adelaide University (Australia)*

Learning materials in most of todays online learning platforms are siloed and disconnected. Rhizi is web software to deepen the online connections between learning materials with meaning and context. It is a WordPress for knowledge-graphs that enables users to freely make connections between a paragraph from a blog, research data, a video segment, people and more. These connections are special: They can be shared with your community, peer-reviewed, visualized, followed, and contain explorable context understood by both man and machine. Open source, open data and free, Rhizis are built collaboratively and empower communities, students, educators, researchers, and governments to create, share, and explore open learning materials in new ways.

Rhizi.net can be used for many different education methods, our first use case is with edX and the French FUN platform, but can be used as an additional layer to any Massive Open Online Course (MOOC) system. These annotations are accessible to course participants and supply insight and context to the learning materials. We provide open analytics so both teacher and student can see where students interact, and which concepts discussed.

Rhizi.net early adopters include EdX, the Israeli Center for educational technology, Paris-Sorbonne, MIT, Stanford, and Oxford.

Demo: http://rhizi.org

Solvonauts : an open educational search engine

Pat Lockley
Consultant (UK)

Solvonauts is (we believe) the only open educational resource search engine which returns only CC or public domain licensed materials. We harvested from over 1,500 sites including repositories, flickr and tumblr. We are a fully working open source, open data, open pretty much everything open educational resource search engine.

Demo: http://solvonauts.org

TuvaLabs Data Literacy Skills for a Brighter Future

Harshil Parikh, Jaimin Patel, Benjamin Farahmand and Rachana Pandey
Tuvalabs (US and India)

We are living in an open data renaissance. Governments, institutions, and organizations across the globe are making their data available for free use, reuse, and redistribution. At TuvaLabs, we believe that visualizing, analyzing, and interpreting data, and communicating your insights have become gateway skills for future STEM jobs, to full participation in the workforce, and civic engagement in 21st century. Our mission is to help students develop these data literacy skills,

enable them to be critical thinkers and persistent problem solvers, and empower them to become active members in their own communities and global citizens of the world.

TuvaLabs transforms open data into opportunities for meaningful teaching and learning in the classroom, using it can be a lever to bring neighborhoods and communities closer together through education. Teachers across grades and subjects implement lessons, activities, investigations, and projects that enable their students to explore real data on the TuvaLabs platform. We leverage high quality open data sources to curate datasets that teachers and students find meaningful and for teaching and learning in the classroom. At TuvaLabs, we envision a world in which students are empowered with the skills and tools to address tomorrows environmental, economic, and societal challenges through open data.

Demo: https://www.tuvalabs.com

4.2 Focused Track: Simplificator

The electronic Discharge Letter (eDL) mobile app

Leonardo Lezcano, Michel Triana% , Bridget Maher+, Pat Henn+, Carola Orrego=, Lina Stieger-, Hanna Schroeder-, Susanne Druener-, Sasa Sopka- and Marcus Specht**

** Open University of the Netherlands (Netherlands), % JM Family Enterprises, Inc. (US), + University College, Cork (Ireland), = Universitat Autnoma de Barcelona (Spain), - University Hospital, Aachen, (Germany)*

Discharge letters are important issues to consider when ensuring patient safety as they represent the transfer of patient care from one care-giver to another in a time of particular risk for medical errors. Nowadays, paper based letters, unstructured texts, unstandardized diagnosis, language barriers, incompleteness and ambiguity make discharge letters a breakpoint in the clinical information workflow that must be addressed. This paper presents the Electronic Discharge Letter (eDL) mobile app as a revolutionary approach to transfer eDLs and prevent the above-mentioned complications. A seamless exchange between doctors, specialists and patients is technically supported by the app through the Near Field Communication standards. To achieve semantic interoperability, the eDL app combines the CLAS scale for discharge letters with nine clinical terminologies and linked data sources. It encourages the adoption of a handover standard and the integration with healthcare systems. In addition, the eDL app contributes to patient empowerment by offering multilingual definitions and translations of clinical concepts from terminology/ontology mappings rather than text-based searches. It automatically raises allergy alerts based on current prescriptions and previous diagnosis, all of which will ultimately improve the continuity of care, and simplify doctors workflow and patient decisions. The app potential for mobile learning in healthcare settings should be also considered.

Demo video: http://youtu.be/bAT0JKPPZu4

Visualization of Labour Conflicts in the Netherlands for last 700 years
Vyacheslav Tykhonov
International Institute of Social History, Amsterdam (Netherlands)

The visualisation interface for the Strikes case study provides a visual interface to the process undertaken in HiTiME and ISHER projects for discovering articles related to strike events in the KB archive and linking these to strike entity events, as these are defined and described in the Strikes DB. The overall objective of the visualisation interface for the Strikes case study is the provision of a visual overview of linked and associated data from primary and secondary historical resources, such as the Strikes DB and the KB archive. This data overview is intended to support historians in retrieving information and in spotting significant data trends across time and space that may lead to new insights about historical facts and events that were thus far scattered along various sources.

Demo: http://node-195.dev.socialhistoryservices.org/strikes/

5 Organization and Acknowledgements

Mathieu d'Aquin (Data and Support Coordinator) is a research fellow at the Knowledge Media Institute of The Open University, and his research activities focus on the Semantic Web, and especially on methods and tools to build intelligent applications exploiting online knowledge. Mathieu has been involved in the organisation of events such as the IWOD series of workshops and the SSSW summer school.

Stefan Dietze (Project Coordinator) is a Senior Researcher at the L3S Research Center of the Leibniz University Hannover (Germany). His main research interests are in Semantic Web and Linked Data technologies and their application to Web data integration problems in particular in the field of education. Stefan has been involved in the organisation of numerous events, such as ACM Web Science 2012 or the Linked Learning workshop series.

Hendrik Drachsler (Evaluation Coordinator) is Assistant Professor at the CELSTEC institute of the Open University in the Netherlands. He is focusing on the personalisation of learning with information retrieval technologies and especially recommender systems. Therefore, he is interested in research on educational datasets, linked data, data mashups, data visualisations and learning analytics.

Marieke Guy (Dissemination Coordinator) is Project Coordinator at the Open Knowledge Foundation. Marieke trained as an information manager and has an excellent depth of expertise in digital infrastructure, information policy and data management.

Eelco Herder (Challenge Coordinator) is a Senior Researcher at the L3S Research Center. His research areas include Web personalization, user modeling, usability and HCI in general. He organized several workshops at UMAP, ESWC and IUI. He is program chair for Hypertext 2014 and was member of the organization committees for UMAP 2013, 2012 and 2011, CHI 2012 and Adaptive Hypermedia 2008.

The submissions have been reviewed by an evaluation panel, led by the LinkedUp Advisory Board:

- Sören Auer, University of Bonn, Germany
- Balaji Venkataraman, Commonwealth of Learning, Canada
- Dan Brickley, Google, UK
- Philippe Cudre-Mauroux, EPFL, Switzerland

The evaluation panel consisted of the following members:

- Jesus G. Boticario, UNED, Spain
- Dirk Börner, Open Universiteit Nederland
- Cristian Cechinel, Federal University of Pelotas, Brazil
- Adam Cooper, CETIS, University of Bolton, UK
- Franca Giannini, Institute for the Applied Mathematics and Information Technologies CNR, Italy
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