Geophysical Research Abstracts
Vol. 15, EGU2013-1143, 2013
EGU General Assembly 2013

Vocabulary services to support scientific data interoperability

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Shared vocabularies are a core element in interoperable systems. Vocabularies need to be available at run-time, and where the vocabularies are shared by a distributed community this implies the use of web technology to provide vocabulary services. Given the ubiquity of vocabularies or classifiers in systems, vocabulary services are effectively the base of the interoperability stack. In contemporary knowledge organization systems, a vocabulary item is considered a concept, with the "terms" denoting it appearing as labels. The Simple Knowledge Organization System (SKOS) formalizes this as an RDF Schema (RDFS) application, with a bridge to formal logic in Web Ontology Language (OWL).

For maximum utility, a vocabulary should be made available through the following interfaces:
[U+0336] the vocabulary as a whole – at an ontology URI corresponding to a vocabulary document
[U+0336] each item in the vocabulary – at the item URI
[U+0336] summaries, subsets, and resources derived by transformation
[U+0336] through the standard RDF web API – i.e. a SPARQL endpoint
[U+0336] through a query form for human users.

However, the vocabulary data model may be leveraged directly in a standard vocabulary API that uses the semantics provided by SKOS. SISSvoc3 [1] accomplishes this as a standard set of URI templates for a vocabulary. Any URI comforming to the template selects a vocabulary subset based on the SKOS properties, including labels (skos:prefLabel, skos:altLabel, rdfs:label) and a subset of the semantic relations (skos:broader, skos:narrower, etc). SISSvoc3 thus provides a RESTFul SKOS API to query a vocabulary, but hiding the complexity of SPARQL. It has been implemented using the Linked Data API (LDA) [2], which connects to a SPARQL endpoint. By using LDA, we also get content-negotiation, alternative views, paging, metadata and other functionality provided in a standard way.
A number of vocabularies have been formalized in SKOS and deployed by CSIRO, the Australian Bureau of Meteorology (BOM) and their collaborators using SISSvoc3, including:
[U+0336] geologic timescale (multiple versions)
[U+0336] soils classification
[U+0336] definitions from OGC standards
[U+0336] geosciml vocabularies
[U+0336] mining commodities
[U+0336] hyperspectral scalars
Several other agencies in Australia have adopted SISSvoc3 for their vocabularies.
SISSvoc3 differs from other SKOS-based vocabulary-access APIs such as GEMET [3] and NVS [4] in that
(a) the service is decoupled from the content store,
(b) the service URI is independent of the content URIs
This means that a SISSvoc3 interface can be deployed over any SKOS vocabulary which is available at a SPARQL endpoint. As an example, a SISSvoc3 query and presentation interface has been deployed over the NERC vocabulary service hosted by the BODC, providing a search interface which is not available natively.
We use vocabulary services to populate menus in user interfaces, to support data validation, and to configure data conversion routines. Related services built on LDA have also been used as a generic registry interface, and extended for serving gazetteer information.

ACKNOWLEDGEMENTS

The CSIRO SISSvoc3 implementation is built using the Epimorphics ELDA platform

http://code.google.com/p/elda/. We thank Jacqui Githaiga and Terry Rankine for their contributions to SISSvoc design and implementation.

REFERENCES

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2. Linked Data API http://code.google.com/p/linked-data-api/wiki/Specification
3. GEMET https://svn.eionet.europa.eu/projects/Zope/wiki/GEMETWebServiceAPI
4. NVS 2.0 http://vocab.nerc.ac.uk/