

Value Sets via Ontology Views

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Abstract

We present a method for defining value sets as queries over ontologies (ontology views), and a mechanism for evaluating such queries. In particular we demonstrate an approach utilizing reusable template queries and parameterized URLs. We illustrate this method using an example from the Ontology of Clinical Research (OCRe).

Introduction

Value sets are typically used to constrain the allowed entries in data entry form fields. They help to prevent data entry errors. Additionally, when the allowed values are derived from ontologies or other standard vocabularies, they aid in subsequent data reuse.

Value sets may be encoded directly into a data entry application, as a pre-defined enumeration of permissible values. But such an implementation lacks a description of how and from where its values were derived and how it should evolve. As one method for providing such a description, we implemented an ontology query-based solution to value set definition within our View Query Manager (QM) application¹.

The QM enables users to compose, edit, evaluate, save, share, and discover view queries. It generates unique identifiers for stored queries. The associated Query Execution Service (QES) provides a RESTful interface for evaluating QM queries based on those identifiers.

An example from OCRe

- ▼ ● Biospecimen preservation method
 - Fast freeze
 - Formalin fixation
 - OCT media
 - Para-formaldehyde fixation
 - Slow freeze

Figure 1. Biospecimen preservation method class hierarchy from OCRe.

We illustrate using a simple example. As members of our value set, we include all biospecimen_preservation_methods specified in OCRe. The specific preservation methods are represented in OCRe using the subclass property (see Figure 1). Figure 2 shows a template query, which is stored in the QM, and which supports general subclass queries (using rdfs:labels as class identifiers rather than URIs). <#0>, <#1>, and <#2> are substitution points in the template query.

```
CONSTRUCT {<#0> valset:Member ?y_label}
FROM <#1>
WHERE
{
    ?x rdfs:label <#2>.
    ?y rdfs:subClassOf ?x.
    ?y rdfs:label ?y_label.
}
```

Figure 2. Subclass value set template query (PREFIX statements omitted) with unique identifier qid=85.

Figure 3 illustrates a runnable URL that generates our example value set, from the template query in Figure 2, using the QES TemplateQuery method for parameter substitution:

```
http://purl.org/sig/TemplateQuery?qid=85&args=
    valset:Bio_pres_method_value_set,
    <http://purl.org/sig/detwiler/OCRe/OCReMerged.owl>,
    "Biospecimen preservation method"@en
```

Figure 3. Biospecimen preservation method URL.

The first URL parameter in Figure 3, qid=85, specifies the template query to execute. The second parameter, args, presents a comma separated list of template substitutions. The first argument in the list is substituted for all occurrences of <#0> in the template query, the second for <#1>, etc. Figure 4 shows the results of resolving the previous URL (simplified for readability).

```
valset:Bio_pres_method_value_set valset:Member
    "Fast freeze"@en,
    "Formalin fixation"@en,
    "OCT media"@en,
    "Para-formaldehyde fixation"@en,
    "Slow freeze"@en.
```

Figure 4. Results returned from URL resolution

Conclusion

The QM supports the definition of values sets as ontology queries. Template queries allow common queries to be reused for multiple value set definitions. The QES provides a RESTful interface for evaluating such definitions and provides resolvable unique identifiers (URIs) for the results (potentially usable for data entry form generation).

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References

1. Detwiler LT, Shaw M, Brinkley JF. Ontology View Query Management. Proc AMIA Symp. 2010