NCBO Technology Overview

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Outreach Coordinator
Links of Interest

• http://www.bioontology.org/wiki/index.php/NCBO_Web_Services_and_the_Development_of_Semantic_Applications
Outline

• Learning Objectives
• REST Web services
• BioPortal
• NCBO Web Services
• BioPortal SPARQL Endpoint
Learning Objectives

• Learn what Web services are available from NCBO

• Learn how to programmatically use these Web services

• Learn how to combine these Web services to perform tasks
REST Web Services

• Accessed via HTTP
  – http://rest.bioontology.org/{parameters}
• Each unique URL is a representation of some object
• Operations include GET, POST, PUT, DELETE
• Lightweight, easy to build
Outline

- REST Web services
- BioPortal
- NCBO Web Services
- BioPortal SPARQL Endpoint
Welcome to BioPortal! For help using BioPortal, click on this icon:  

### Most Viewed Ontologies (October, 2011)

<table>
<thead>
<tr>
<th>Ontology</th>
<th>Views</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Drug File</td>
<td>7975</td>
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<tr>
<td>SNOMED Clinical Terms</td>
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<td>MedDRA</td>
<td>3293</td>
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<td>Medical Subject Headings</td>
<td>1620</td>
</tr>
<tr>
<td>NCI Thesaurus</td>
<td>1227</td>
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</tbody>
</table>

### Latest Notes

**RE: what's the difference between this note and notes on mappings?**
(Biomedical Resource Ontology) about 1 month ago by whetzel
The Term Notes refer to comments or actions requested on Terms in the ontology. The Mapping Notes...

**what's the difference between this note and notes on mappings?**
(Biomedical Resource Ontology) 2 months ago by imposimon
Would you guys please answer this for me?

**Re: Why have you deprecated this?**
(Biomedical Resource Ontology) 4 months ago by whetzel
This term was deprecated because there was a typo in the term name.

**Why have you deprecated this?**
(Biomedical Resource Ontology) 1 month ago by whetzel

### Latest Mappings

- **b117.** Intellectual functions (International Classification of Functioning, Disability and Health (ICF)) => Ability to perform cognitive activity (SNOMED Clinical Terms)
  - 11/18/11 11samontu

- **b110.** Consciousness functions (International Classification of Functioning, Disability and Health (ICF)) => Consciousness related finding (SNOMED Clinical Terms)
  - 11/18/11 11samontu

- **b114.** Orientation functions (International Classification of Functioning, Disability and Health (ICF)) => Orientation (SNOMED Clinical Terms)
  - 11/18/11 11samontu

- **b1109.** Consciousness functions, unspecified (International Classification of Functioning, Disability and Health (ICF)) => Consciousness activities (SNOMED Clinical Terms)

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http://bioportal.bioontology.org
Outline

• REST Web services
• BioPortal
• NCBO Web Services
• BioPortal SPARQL Endpoint
ONTOLOGY WEB SERVICES

Accessing, browsing, searching and traversing ontologies in Your application
Ontology Web Services

• List All Ontologies
  – List all ontologies in BioPortal
Ontology version id

One ontology id has many ontology version ids

Ontology id

Ontology version id

<accessedResource>/biopoanal/ontologies</accessedResource>
<accessDate>2011-12-04 22:01:39.603 PST</accessDate>

<data>
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    <dateReleased>2010-08-30 00:00:00.0 PDT</dateReleased>
    <isManual>1</isManual>
    <displayLabel>Medical Subject Headings</displayLabel>
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  - <description>
    Medical Subject Headings (MeSH);National Library of Medicine;February, 2009;Bethesda, MD;ENG
  </description>
  <abbreviation>MSH</abbreviation>
  <format>RRF</format>
Ontology Web Services cont.

• Search
  – Search by term or term identifier across all ontologies in BioPortal


• Example clients
Ontology Web Services cont.

• Term

• Hierarchy
NOTES WEB SERVICES

Propose new terms and comment on ontologies
Notes Web Service

• Add terms proposals and comments on ontology terms

• Documentation:
### Biomedical Resource Ontology

#### Notes

**New Term Proposal: Exercise Study Facility**

New Term Proposal submitted by Mette over 1 year ago on Physiology Facility in Biomedical Resource Ontology

<table>
<thead>
<tr>
<th>PREFERRED NAME</th>
<th>PROVISIONAL ID</th>
<th>PARENT</th>
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<tbody>
<tr>
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</tr>
</tbody>
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**SYNONYMS**
- facility child

**DEFINITION**
A facility or core devoted to exercise studies

#### Responses

**RE: New Term Proposal: Exercise Study Facility** by whetzell over 1 year ago

Can you expand on what an exercise study is?
WebProtégé

http://protegewiki.stanford.edu/wiki/WebProtege
VIEWS

Custom subset of large ontologies
Views and Value Sets

• Users can submit their own derivatives of BioPortal ontologies
  – these which become first-class objects in BioPortal and can be used as all other Web services
Views in BioPortal

**Views**

Create new view

Expand All | Collapse All

- CORE Subset of SNOMED CT
- Neoplasm_breast_cancer
- Neoplasm_hamartoma
- SNOMED Anatomy
- SNOMED Clinical Findings
  - Description: The Clinical Finding subtree of SNOMED CT
  - Definition: Class subtree of ClinicalFinding
  - Ontology ID: 2018
  - Definition Language: Manual

<table>
<thead>
<tr>
<th>VERSION</th>
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<th>CREATED BY</th>
<th>ONTOLOGY FILE</th>
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</table>

- SNOMED Ethnic Group
- SNOMED Morphologically Abnormal Structure
- SNOMED Organism
- SNOMED Terminos Clinicos
- SNOMED Test Findings
Views and Value Sets

• View Extraction Web service
  – Given a root node term, extracts all child terms
    http://bit.ly/uXeh2s

• Access directly from Protégé via the BioPortal Import plugin
MAPPING WEB SERVICES

Using NCBO technology to integrate terminologies and ontologies
Mappings

Ontology A

Ontology B

Upload or Download mapping subsets
Mappings

• Mappings Web service

• Functions
  – Get
  – Create/Upload

• Example Perl client to Get mappings: http://bit.ly/tDKPQd
WIDGETS

Using NCBO technology on your web pages
Widgets

- Form auto-complete – auto-complete function and can return term URI, term ID or term name
- Jump To – auto-complete function to select term and Jump To BioPortal to view term details
- Visualize widget – view the ontology structure and relations
- Tree widget – view the ontology tree

Code for widgets is available on BioPortal
Widgets

Form auto-complete

Jump To

RSS feed
Widgets

Visualization

Tree widget
Break
ANNOTATOR WEB SERVICE

Using Ontologies to Annotate Your Data
Annotator: The Basic Idea

- Tag textual metadata with ontology terms
Annotator Workflow

1. Raw Text
   - Tomorrow, and tomorrow, and tomorrow, creeps in this petty pace from day to day, until the last syllable of recorded time. And all our yesterdays have lighted fools the way to dusty

2. Entity Recognition Tool
   - Mgrep
   - MetaMap

3. Direct Annotations
   - Dictionary
   - UMLS
   - BioPortal

4. Mapping
   - Semantic Expansion Components

5. Analysis
   - Is_a Transitive Closure
   - Semantic Distance

6. Semantically Expanded Annotations
   - TXT
   - CSV
   - XNL
   - OWL
Annotator Web Service

• Tag free text with ontology terms
• Documentation: http://www.bioontology.org/wiki/index.php/Annotator_Web_service
• Example clients:
DATA SERVICE

Using Ontologies to Access Public Data
Resource Index: The Basic Idea

- The index can be used for
  - Search
  - Data mining
Resources index: Example

Accessing resource elements

Concept recognition

Semantic expansion

172 closure annotations

Examples:
- Cancer, concept (DOID:162) in ontology Human disease
- Skin Neoplasms, concept (DOID:3165) in ontology Human disease

23 direct annotations
(4 title, 19 description)

Example:
- Melanoma, concept (DOID:1909) in ontology Human disease.
Data Access

• Resource Index Web service
  – Documentation: