

ON²VERS

Online Ontology Versioning



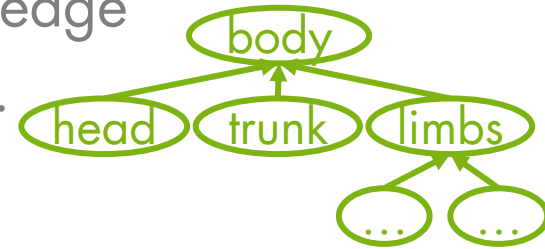
Anika Groß

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in E-Science and E-Humanities
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ONTOLOGY EVOLUTION

- Ontologies: structured representation of knowledge
- Applications: annotations, semantic search, ...
- Ongoing research, new requirements
→ ontology changes, new versions



ON²VERS - ONLINE ONTOLOGY VERSIONING

- Provide services for comprehensive, individual ontology evolution analyses

Application Scenarios

Monitoring
Ontology
Changes

Evolution of
Term Enrichment
Analysis Results

...



Evolution Analysis and Data Migration Services

Basic Analyses
(Statistics,
Search, ...)

Complex Evolution
Analyses (Diff and
Region Detection)

Mapping
Migration



Version Management Services



Ontology and
Mapping Versions

Import Services
OWL, OBO, CSV,
RDF, XML,...

IMPORT ONTOLOGY VERSIONS OF INTEREST

- Example: Import versions of VISO*

The screenshot displays the On²Vers web interface. At the top left, the logo "On²Vers" is shown with the tagline "Online Ontology Versioning". Below the logo, there is a navigation menu with the following items: Overview, Projects, Imports, Ontology Import, Statistics, CODEX, REX, and Mapping Migration. The main content area is titled "Source Import <-> Workspace: VISO". On the left side of this area, a list of ontology versions is displayed for "Graphic@VISO":

- Version: 994, Timestamp: 2012-07-13
- Version: 1022, Timestamp: 2012-07-16
- Version: 1024, Timestamp: 2012-07-18
- Version: 1064, Timestamp: 2012-09-03
- Version: 1126, Timestamp: 2012-10-15
- Version: 1130, Timestamp: 2012-10-23
- Version: 1218, Timestamp: 2013-01-10
- Version: 1221, Timestamp: 2013-01-12

On the right side of the main content area, there is a form for importing a source. It includes a "Click Here To Create New Initial Source" link, radio buttons for "File Format" (obo and owl, with owl selected) and "Location Type" (URL and Upload, with Upload selected). Below these, there is a text input field for "How much versions to import?" with the value "1". At the bottom, there is a search bar with the text "Durchsuchen..." and a "Submit" button. The search results show "viso-graphic_1223_12-03-2013.c" as the "File for Version 1", with "1223" in the "Version" field and "2013-03-12" in the "Timestamp" field.

* Polowinski, J.; Voigt, M.: *VISO: a shared, formal knowledge base as a foundation for semi-automatic InfoVis systems*. CHI'13 Extended Abstracts on Human Factors in Computing Systems, 2013.

COMPUTE DIFF BETWEEN ONTOLOGY VERSIONS

anikagross Logged in as: anikagross Logout

CODEX: Ontology version comparison <--> Workspace: VISO

Ontology: Graphic@VISO

First version: 994 (2012-07-13)

Second version: 1221 (2013-01-12)

Overview

Input

Result Analysis

- Overall Statistics
- Change Explorer
- Change Navigator
- Change Impact
- Download/Export

Overall Diff Statistics

without attribute changes (*chgAttValue, addA, delA*) without single structural changes (*addR, delR, mapR*)

Compact Diff Result

Basic Diff Result

| Change | Count | Details |
|-------------|-------|---------|
| addA | 2 | |
| delA | 1 | |
| delR | 1 | |
| addLeaf | 4 | |
| delInner | 1 | |
| delLeaf | 3 | |
| mapR | 4 | |
| move | 1 | |
| chgAttValue | 2 | |

Change Navigator

| | | |
|-----------------|---|---|
| addA (2) | <code>delLeaf(http://purl.org/viso/data/color_rgb_b) (4)</code> | <code>delC(http://purl.org/viso/data/color_rgb_b)</code> |
| addLeaf (4) | <code>delLeaf(http://purl.org/viso/data/color_rgb_g) (4)</code> | <code>delA(http://purl.org/viso/data/color_rgb_b, name, http://purl.org/viso/data/color_rgb_b)</code> |
| chgAttValue (2) | <code>delLeaf(http://purl.org/viso/data/color_rgb_r) (4)</code> | <code>delA(http://purl.org/viso/data/color_rgb_b, synonym, Color RGB Blue)</code> |
| delA (1) | <code>delLeaf(http://purl.org/viso/data/color_rgb_r) (4)</code> | <code>delA(http://purl.org/viso/data/color_rgb_b, type, property)</code> |
| delInner (1) | | |
| delLeaf (3) | | |
| delR (1) | | |
| mapR (4) | | |
| move (1) | | |

DETECT DIFFERENTLY CHANGING ONTOLOGY REGIONS

On²Vers
Online Ontology Versioning

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REx: Ontology version region analysis <--> Workspace: VISO

Ontology: Graphic@VISO

First version: 994 (2012-07-13)

Last version: 1221 (2013-01-12)

Submit

browser View

input specification search/filter

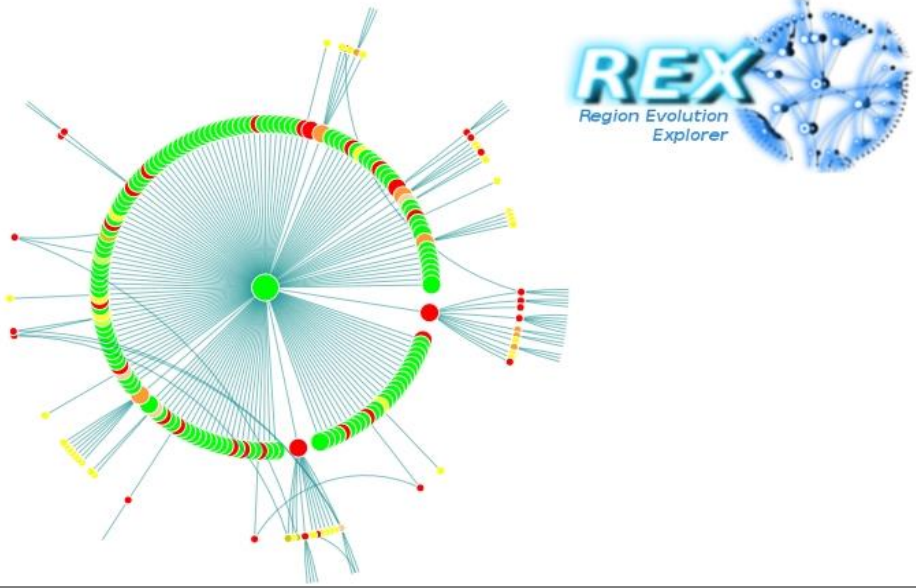
name: VISO

type: Graphic

from: 2012-07-13

to: 2013-01-12

submit



UPDATE ONTOLOGY MAPPINGS

On²Vers
Online Ontology Versioning

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Migration: Ontology version migration <--> Workspace: LifeSciences

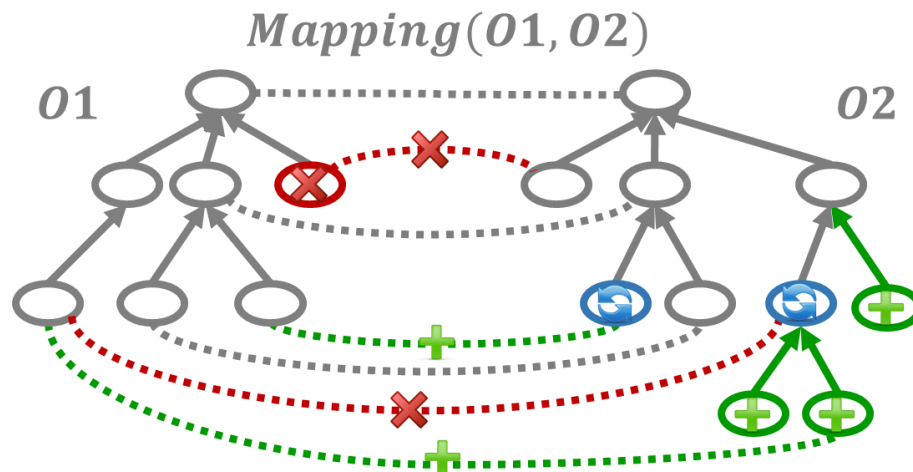
Source ontology AnatomicalEntity@AdultMouseAnatomyOntology Old source version 1.184 (2008-03-09) New source version 1.210 (2013-03-12)

Target ontology AnatomicalEntity@ZebraFishAnatomyOntology Old target version 1.15 (2008-04-29) New target version 1.48 (2013-02-07)

Mapping (Source ontology, Target ontology) AdultMouse_ZebraFish.txt

File Format csv rdf

- Overview
- Projects
- Imports
- Statistics
- CODEX
- REx
- Mapping Migration
- Adapt Old Mapping



Ontology Evolution

- Ontologies: structured representation of knowledge
- Applications: annotations, semantic search, ...
- Ongoing research, new findings → ontology changes, new versions

- Which changes occur between different ontology versions?
- Where are the changes located? Are there (un)stable ontology regions?
- How can we keep dependent ontology-based mappings up-to-date?

→ Need services for comprehensive ontology evolution analyses applicable to individual user ontologies

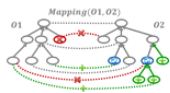
Architecture & Services

- Services for **Online Ontology Versioning (On²Vers)** in eScience network
- Efficient version management, multi user application
- Basic and complex evolution analyses, mapping migration



Mapping Migration

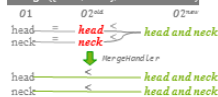
- Update associated ontology or annotation mappings when underlying ontologies change



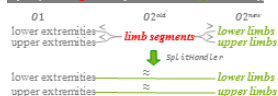
Semi-automatic mapping migration

- Migrate mappings based on diff between ontology versions
- Change Handlers for different change types (concept merge, split ...)

merge((head,neck),head,neck)



split((limb segments),lower limbs,upper limbs)



Evolution Analysis & Applications with On²Vers

Import ontology versions of interest

Compute complex diff between ontology versions

Detect differently changing ontology regions

Update ontology mappings

References

Chen, Y., Groß, A., Hees, H.: 2012, 'A tool for identifying unstable terms in ontology regions', Proc. 12th Int. Conference on Semantic Web, pp. 44-58, Springer, 2012.

Faloutsos, T.: 1999, 'On the stability of ontology terms', Proc. 17th Int. Joint Conference on Artificial Intelligence, pp. 100-105, Morgan Kaufmann, 1999.

Größ, A., Hees, H., Faloutsos, T., Klein, C., Klein, S.: 2011, 'Impact of ontology changes on annotation services', Proc. 11th Int. Conference on Semantic Web, pp. 100-115, Springer, 2011.

Größ, A., Hees, H., Faloutsos, T., Klein, C., Klein, S.: 2012, 'Stability of ontology terms in ontology regions', Proc. 12th Int. Conference on Semantic Web, pp. 44-58, Springer, 2012.

Größ, A., Hees, H., Faloutsos, T., Klein, C., Klein, S.: 2013, 'Stability of ontology terms in ontology regions', Proc. 13th Int. Conference on Semantic Web, pp. 44-58, Springer, 2013.

