

ON²VERS

Online Ontology Versioning



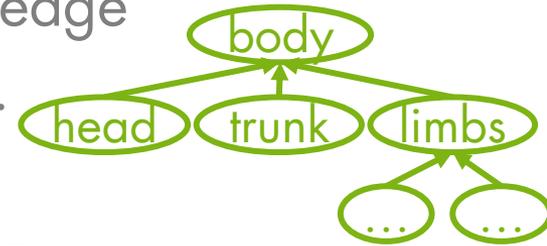
Anika Groß

International Conference on Infrastructures and Cooperation
in E-Science and E-Humanities
6th June 2014, Leipzig



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

...

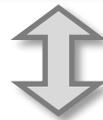


Evolution Analysis and Data Migration Services

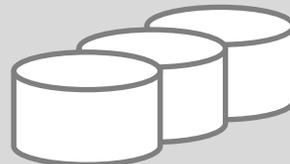
Basic Analyses
(Statistics,
Search, ...)

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 "obo" and "owl" (selected), and radio buttons for "URL" and "Upload" (selected). Below these are input fields for "How much versions to import?" (value: 1), "File for Version 1" (value: viso-graphic_1223_12-03-2013.c), "Version" (value: 1223), and "Timestamp" (value: 2013-03-12). A "Submit" button is located at the bottom of the form.

* 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

On²Vers
Online Ontology Versioning

Logged in as: anikagross

- Overview
- Projects
- Imports
- Statistics
- CODEX
- Ontology Version Changes
- REx
- Mapping Migration

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

Ontology:

First version:

Second version:



CODEX

Overview

Input

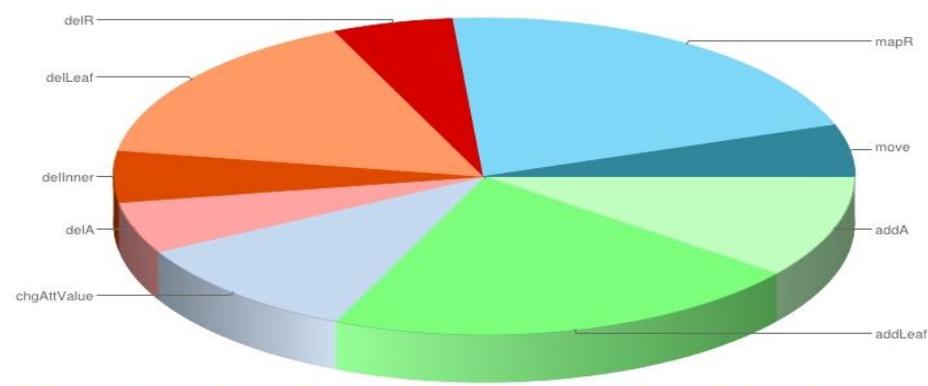
Result Analysis

- 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

Overview

Input

Result Analysis

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

Overview

Input

Result Analysis

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

Change Navigator

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

5

DETECT DIFFERENTLY CHANGING ONTOLOGY REGIONS

On²Vers
Online Ontology Versioning

anikagross Logged in as: anikagross Logout

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

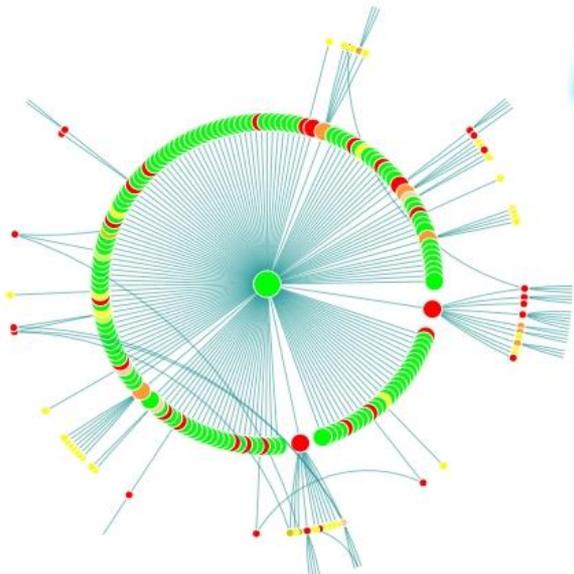
Ontology: Graphic@VISO

First version: 994 (2012-07-13)

Last version: 1221 (2013-01-12)

Submit

browser View



REX
Region Evolution Explorer

input specification search/filter

name: VISO

type: Graphic

from: 2012-07-13

to: 2013-01-12

submit

Overview

Projects

Imports

Statistics

CODEX

REx

Ontology Region Analysis

Mapping Migration

UPDATE ONTOLOGY MAPPINGS

On²Vers
Online Ontology Versioning

anikagross Logged in as: anikagross Logout

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

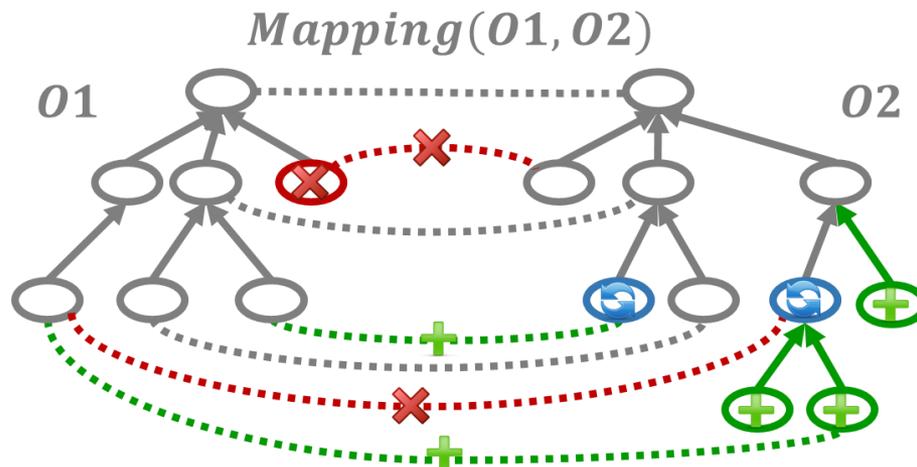
Source ontology AnatomicalEntity@AdultMouseAnatomyOntology Old source version 1.184 (2008-03-09) New source version 1.210 (2013-03-12)

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

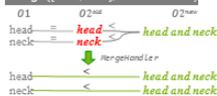
- Update associated ontology or annotation mappings when underlying ontologies change



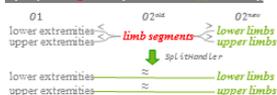
Semi-automatic mapping migration

- 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

The screenshot shows the On²Vers web interface. The top section is titled 'Import ontology versions of interest' and shows a list of ontologies with their respective versions. The bottom section is titled 'Compute complex diff between ontology versions' and displays a pie chart representing the distribution of changes between two versions.

The screenshot shows the On²Vers web interface. The top section is titled 'Detect differently changing ontology regions' and displays a circular diagram with colored segments representing different regions of change. The bottom section is titled 'Update ontology mappings' and shows a list of mappings that need to be updated.

