Awards at the


ESWC 11
8th Extended Semantic Web Conference
29 May - 02 June 2011 | Heraklion, Greece
7 YEAR AWARD RUNNER UP
"Ontology Mapping - An Integrated Approach "
by
Marc Ehrig, York Sure
has received the 7 Year Award Runner Up at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair


ESWC 11
8th Extended Semantic Web Conference
29 May - 02 June 2011 | Heraklion, Greece
ESWC 7 YEARS AWARD
„S-Match: an Algorithm and an Implementation of Semantic Matching“
by
Fausto Giunchiglia, Pavel Shvaiko, Mikalai Yatskevich
has received the ESWC 7 Years Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair


ESWC 11
8th Extended Semantic Web Conference
29 May - 02 June 2011 | Heraklion, Greece
BEST RESEARCH PAPER
„Semantics and optimization of the SPARQL 1.1 federation extension“
by
Carlos Buil Aranda, Oscar Corcho and Marcelo Arenas
has received the Best Research Paper Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair
Best Research Paper Award Sponsors
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BEST SEMANTIC WEB IN-USE PAPER
„miKrow: Semantic Intra-Enterprise Micro-Knowledge Management System“
by
Víctor Penela, Guillermo Álvaro, Carlos Ruiz, Carmen Córdoba, Francesco Carbone, Michelangelo Castagnone, José Manuel Gómez-Pérez and Jesús Contreras
has received the Best Semantic Web In-Use Paper Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair
Best Semantic Web In-Use Paper Award Sponsors
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BEST LOD PAPER
„SIHJoin: Querying Remote and Local Linked Data"
by
Günter Ladwig and Thanh Tran
has received the Best LOD Paper Award at the ESWC 2011
Grigoris Antoniou, 02 June 2011
Conference General Chair
Best LOD Paper Award Sponsor
LOD2


ESWC 11
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29 May - 02 June 2011 | Heraklion, Greece
BEST PHD SYMPOSIUM PAPER
„Optimizing Query Answering over OWL Ontologies“
by
Illianna Kollia
has received the Best Student Paper Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair


ESWC 11
8th Extended Semantic Web Conference
29 May - 02 June 2011 | Heraklion, Greece
BEST DEMO
"wayOU – Linked Data-Based Social Location Tracking in a Large, Distributed Organisation"
by
M. D'Aquin, F. Zablith and E. Motta
has received the Best Demonstration Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair


ESWC 11
8th Extended Semantic Web Conference
29 May - 02 June 2011 | Heraklion, Greece
BEST POSTER
"A Semantic-based Pervasive Computing Approach for Smart Building Automation"
by
Giuseppe Loseto
has received the Best Poster Award at the ESWC2011
Grigoris Antoniou, 02 June 2011
Conference General Chair

AI Mashup Challenge 2011

https://sites.google.com/a/fh-hannover.de/aimashup11/

Account and Awards

linguatec language technologies

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[The Sign of Excellence] ADDISON-WESLEY

AI Mashup Challenge 2011

- 8 mashups participating in the AI Mashup Challenge
- 4 company-sponsored awards, decided upon by a vote of ESWC participants and reviewers
- 51 ESWC participants and 6 reviewers (of 12) voted

AI Mashup Challenge 2011

The ESWC participants‘ vote

Mashup name	votes	rank
Books@HPCLab	3	5
GameDipper	0	8
hyProximity	13	2
NewsAgent	1	7
Sensors / Videk	8	3
Szatakipedia	3	5
Topica	7	4
Traffic_LarKC	16	1

AI Mashup Challenge 2011

The ESWC participants‘ vote

Mashup name	votes	rank
Books@HPCLab	3	5
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Sensors / Videk	8	3
Szatakipedia	3	5
Topica	7	4
Traffic_LarKC	16	1

AI Mashup Challenge 2011

The reviewers‘ vote

Mashup name	votes	rank
Books@HPCLab	4	5
GameDipper	6	4
hyProximity	4	5
NewsAgent	4	5
Sensors / Videk	6	4
Szatakipedia	7	3
Topica	11	1
Traffic_LarKC	11	1

AI Mashup Challenge 2011

Combined rank / award winners

Name	RevR	AudR	CombR	Win
Books@HLPLab	5	5	5	6
Game Dipper	4	8	6,4	8
hyProximity	5	2	3,2	**3**
NewsAgent	5	7	6,2	7
Sztakipedia	3	5	4,2	5
Topica	1	4	2,8	**2**
Traffic_LarKC	1	1	1	**1**
Videk	4	3	3,4	**4**

CombR = RevR * 40/100 + AudR * 60/100

AI Mashup Challenge 2011

Award Certificate

We congratulate

Daniele Dell'Aglio, Irene Celino, Emanuele Della Valle, Ralph Grothmann, Florian Steinke, and Volker Tresp

to their 1st prize in the 2011 AI Mashup Challenge.

It is sponsored by Elsevier with an amount of € 1.750.

Hersonissos, 2nd June 2011

For the organization committee

Brigitte Endres-Niggemeyer

AI Mashup Challenge 2011

Award Certificate

We congratulate

A. Elizabeth Cano, Gregoire Burel, Aba-Sah Dadzie, and Fabio Ciravegna

to their 2nd prize in the 2011 AI Mashup Challenge.

It is sponsored by linguatec with a speech outfit for the group.

Hersonissos, 2nd June 2011

For the organization committee

Brigitte Endres-Niggemeyer

AI Mashup Challenge 2011

Award Certificate

We congratulate

Milan Stankovic

to his 3nd prize in the 2011 AI Mashup Challenge.

It is sponsored by O'Reilly and brings a set of O'Reilly web books.

Hersonissos, 2nd June 2011

For the organization committee

Brigitte Endres-Niggemeyer

AI Mashup Challenge 2011

Award Certificate

We congratulate

Klemen Kenda, Carolina Fortuna, Blaz Fortuna, and Marko Grobelnik

to their 3nd prize in the 2011 AI Mashup Challenge.

It is sponsored by Addison-Wesley and brings a set of enterprise mashup books.

Hersonissos, 2nd June 2011

For the organization committee

Brigitte Endres-Niggemeyer

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AI Mashup Challenge 2011

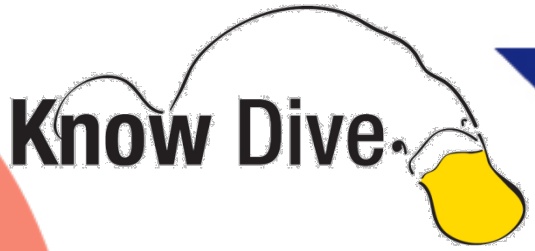
Thanks
for all contributions
and
for your attention

!

S-Match

7 years of research and exploitation

UNIVERSITY
OF TRENTO - Italy



ESWC 2011
7-Year Award Ceremony

presented by Pavel Shvaiko, Informatica Trentina, Italy

The Paper

S-Match: an algorithm and an implementation of semantic matching

Fausto Giunchiglia, Pavel Shvaiko, Mikalai Yatskevich

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Abstract. We think of *Match* as an operator which takes two graph-like structures (e.g., conceptual hierarchies or ontologies) and produces a mapping between those nodes of the two graphs that correspond semantically to each other. Semantic matching is a novel approach where semantic correspondences are discovered by computing, and returning as a result, the semantic information implicitly or explicitly codified in the labels of nodes and arcs. In this paper we present an algorithm implementing semantic matching, and we discuss its implementation within the *S-Match* system. We also test *S-Match* against three state of the art matching systems. The results, though preliminary, look promising, in particular for what concerns precision and recall.

1 Introduction

We think of *Match* as an operator that takes two graph-like structures (e.g., conceptual hierarchies, database schemas or ontologies) and produces mappings among the nodes of the two graphs that correspond semantically to each other. *Match* is a critical operator in many well-known application domains, such as schema/ontology integration, data warehouses, and XML message mapping. More recently, new application domains have emerged, such as catalog matching, where the match operator is used to map entries of catalogs among business partners; or web service coordination, where match is used to identify dependencies among data sources.

We concentrate on *semantic matching*, as introduced in [6], based on the ideas and system described in [2]. The key intuition behind semantic matching is that we should calculate mappings by computing the semantic relations holding between the concepts (and not labels!) assigned to nodes. Thus, for instance, two concepts can be equivalent, one can be more general than the other, and so on. We classify all previous approaches under the heading of *syntactic matching*. These approaches, though implicitly or explicitly exploiting the semantic information codified in graphs, differ substantially from our approach in that, instead of computing semantic relations between nodes, they compute syntactic "similarity" coefficients between labels, in the [0,1] range. Some examples of previous solutions are [12], [1], [15], [18], [5], [10]; see [6] for an in depth discussion about syntactic and semantic matching.

In this paper we propose and analyze in detail an algorithm and a system implementing semantic matching. Our approach is based on two key notions, the notion of

ESWS 2004: Heraklion, Greece

Fausto Giunchiglia

Pavel Shvaiko

Mikalai Yatskevich

The Team

S-Match
Fausto Giunchiglia
Pavel Shvaiko
Mikalai Yatskevich
Aliaksandr Autayeu

Minimal Mappings
Fausto Giunchiglia
Vincenzo Maltese
Aliaksandr Autayeu

Structure Preserving Semantic Matching
Fausto Giunchiglia
Juan Pane
Lorenzino Vaccari
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Background Knowledge Datasets
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Gaia Trecarichi


Juan Pane

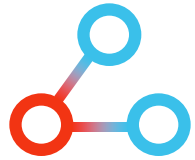

Lorenzo Vaccari


Feroz Farazi


Biswanath Dutta

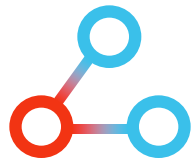

Vincenzo Maltese

Overview



- Introduction to S-Match
- Lightweight Ontologies
- Matching Tools
  - S-Match
  - Structure Preserving Semantic Matching (SPSM)
  - MinSMatch for minimal mappings
- Evaluations
- Enhancements: NLP, BK
- Open Source Framework
- Exploitation
- Future activities

Living with heterogeneity [KER-03]



- The semantic web will be: huge, dynamic and heterogeneous. These are **not bugs**, these are **features**
- We must learn to live with them and master them
- Often information resources expressed in different ways must be reconciled before being used. Mismatch between formalized knowledge can occur when:
  - different languages are used
  - different **terminologies** are used
  - different **modeling** is used

On reducing heterogeneity [KER-03]

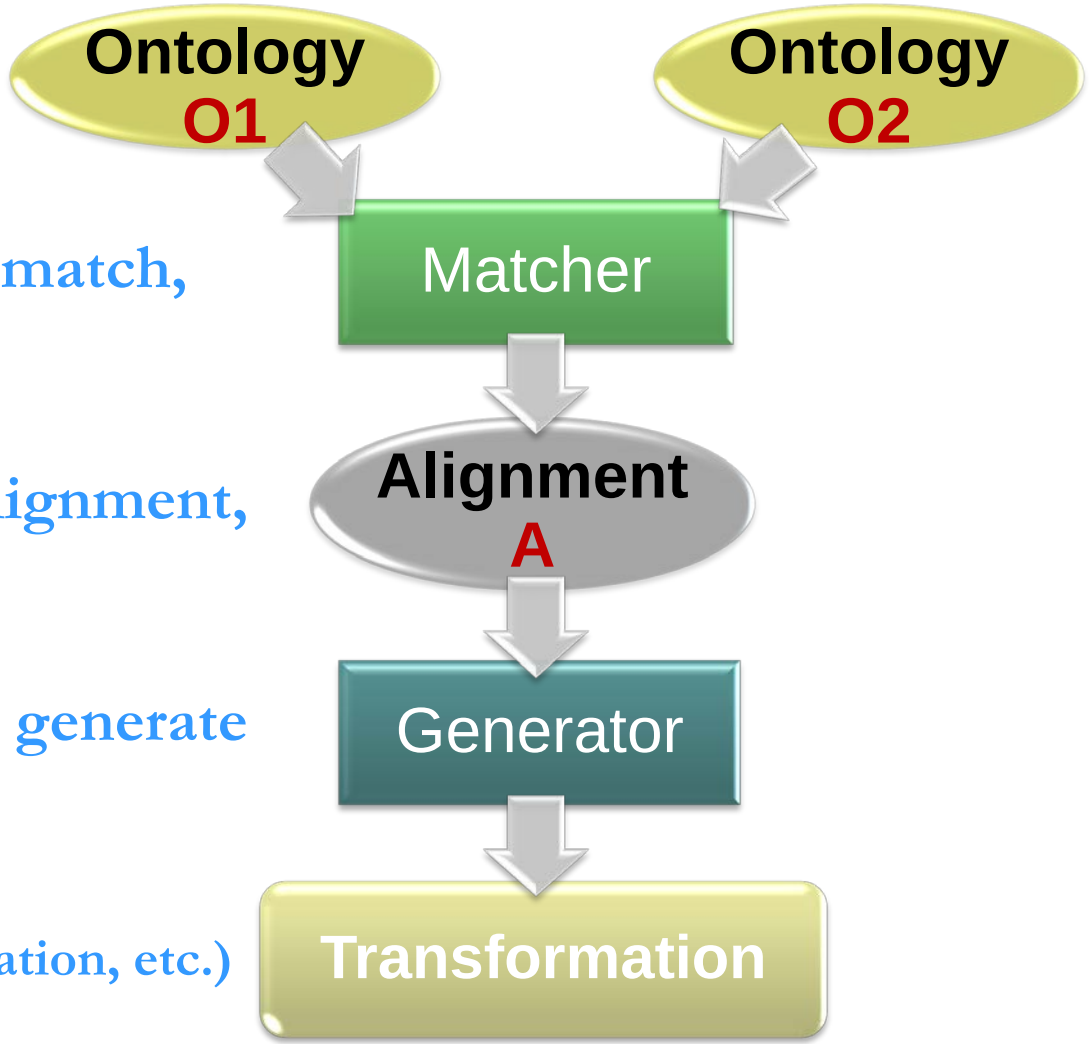
Reconciliation can be performed in 2 steps:

(i) match,

thereby determine an alignment,

(ii) generate

a processor (for transformation, etc.)

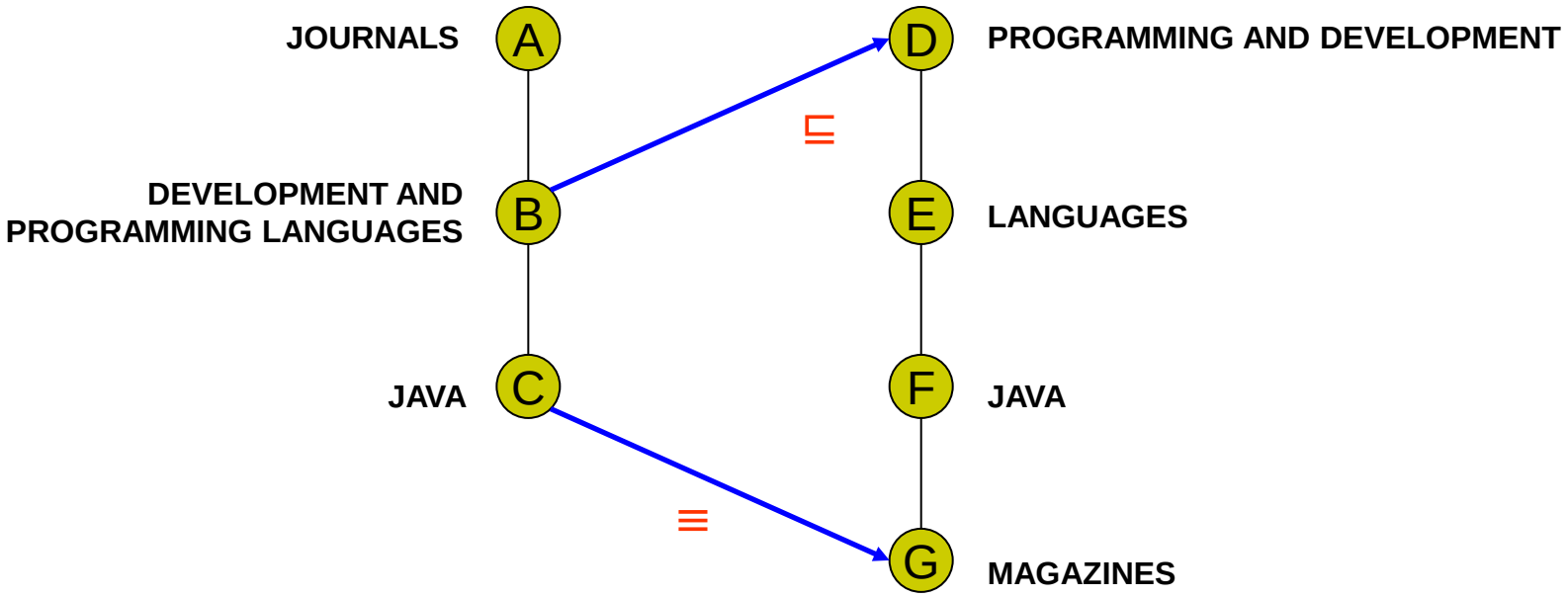


2004: what made the difference?

- About 30+ matching systems existed in 2004
  - Cupid, COMA, Rondo, NOM, OLA, Prompt, Anchor-Prompt, CtxMatch, …
  - now 100+ systems exist
- [0..1] vs. { =, < , > , ⊥ }
  - Most systems were computing and aggregating various similarity measures in [0 1] to produce alignments
  - We computed logical relations: equivalence, subsumption, …
- Heuristics vs. soundness and completeness
  - Most systems were using matching heuristics that sometimes worked well, sometimes not so well. We followed this path as well, but…
  - One step of the matching process was sound and complete

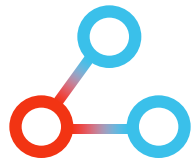
What is Semantic Matching [KER-03]

- An operation that identifies semantically similar nodes in two graph-like structures



- Applications: catalog integration, peer to peer information sharing, resource discovery, query answering, …

The Key Idea [KER-03, ESWS-04]



- Take as input two **graph-like structures**, e.g., ontologies
- Return as output **logic relations**, e.g., equivalence, subsumption, which are supposed to hold between the nodes of the graphs
- Entities of the input ontologies are translated into **propositional formulas** which explicitly express the concept descriptions as encoded in the **ontology structure and in external resources**, such as WordNet
- Translation of the matching problem into a **propositional validity problem**
- Propositional validity problem, efficiently resolved using **sound and complete** propositional satisfiability (SAT) solvers

S-Match Algo Key Steps [ESWS-04]

- Given two trees (lightweight ontologies) T1 and T2 :

1. For all labels in T1 and T2 compute concepts at labels (analysis of labels in isolation; from natural language to propositional logic)
2. For all nodes in T1 and T2 compute concepts at nodes (take into account structure of the trees)
3. For all pairs of labels in T1 and T2 compute relations between atomic concepts at labels (build Theory)
4. For all pairs of nodes in T1 and T2 compute relations between concepts at nodes (run SAT)

- Steps 1, 2: preprocessing phase (once for all)
- Steps 3, 4: matching phase (run-time)

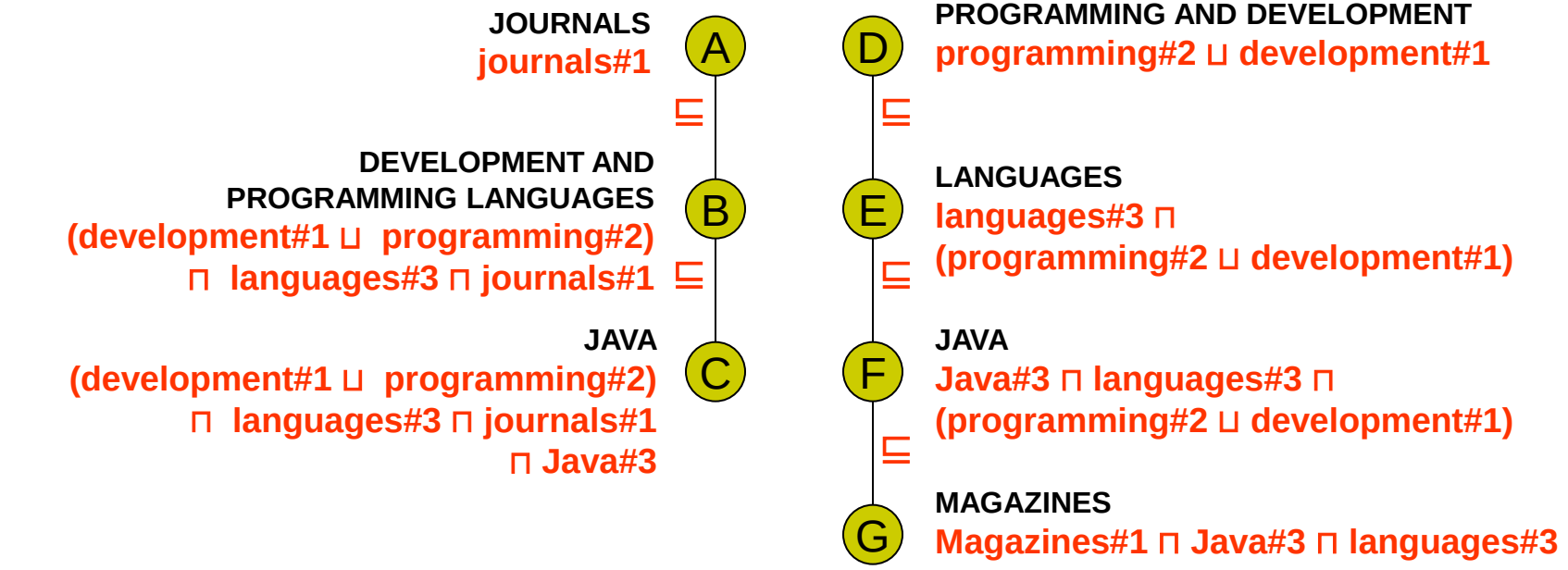
Lightweight Ontologies [JODS-05]

- **Lightweight ontologies are tree structures where concepts at nodes are connected with subsumption in DL**

- **Many of the schemas in the world can be translated into lightweight ontologies**
  - User classifications (file systems, email folder structures)
  - Web directories and business catalogues
  - Library classifications (thesauri, subject headings)

- **With the translation:**
  - Node labels are formulas in propositional Description Logic (DL)
  - Concepts are taken from WordNet senses (or other dictionaries)
  - Tree structures: each node formula is subsumed by parent node formula

Lightweight Ontologies (cont)

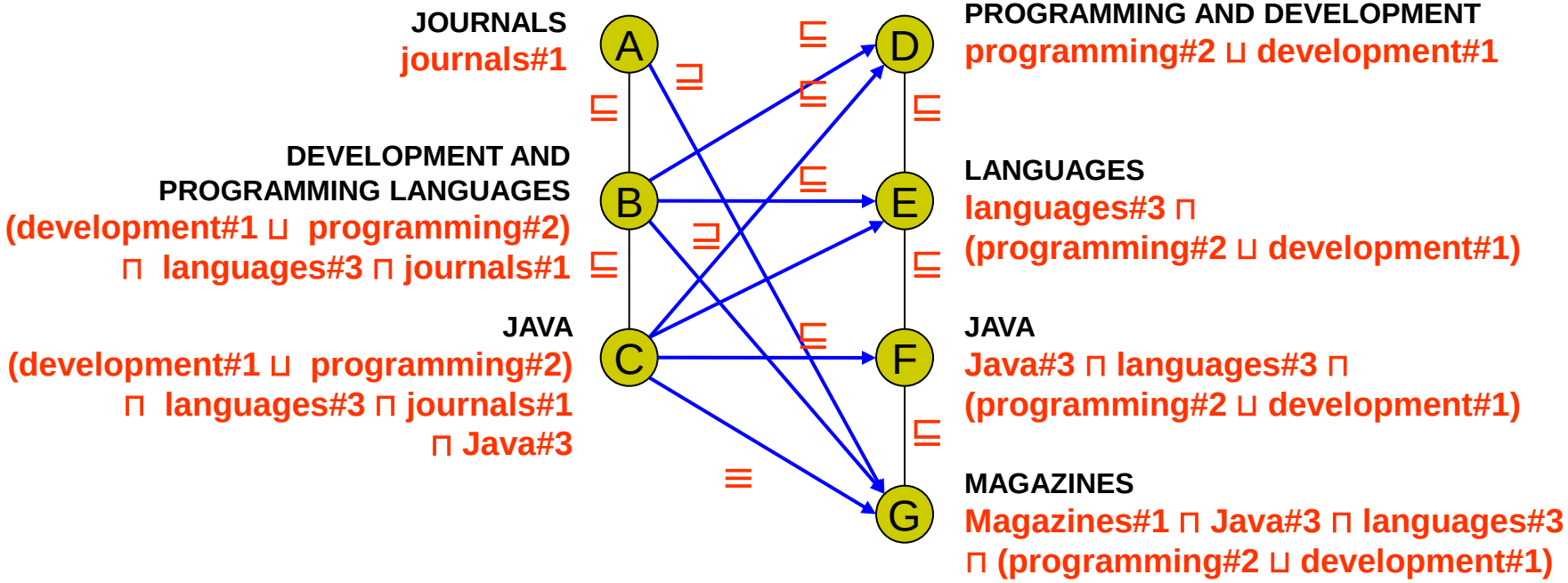


Matching Tools

- **S-Match: the basic semantic matching tool**
  - It returns the set of semantic correspondences between two **lightweight ontologies**
  - Output: ⊥, ⊒, ⊑, ≡
- **SPSM: Structure Preserving Semantic Matching**
  - Only one correspondence per node is returned
  - It matches leaf nodes to leaf nodes and internal nodes to internal nodes
  - Used **to compare function definitions**
- **MinSMatch: to compute minimal mappings**
  - It returns **the minimal set** of semantic correspondences between two lightweight ontologies. It always exists and it is unique
  - It computes **the set of maximum size** (containing the maximum number of minimal and redundant links) from the propagation of the links in the minimal set
- **S-Match GUI**

S-Match [ESWS-04]

- An alignment is a set of mapping elements <source, target, R>
  - R ∈ { '⊥', '≡', '⊑', '⊒'} partially ordered
  - For each pair of nodes a call to a SAT solver verifies if a given semantic relation holds between the two, given the available **background knowledge**
  - Visualization and usability problems (e.g. validation and maintenance)

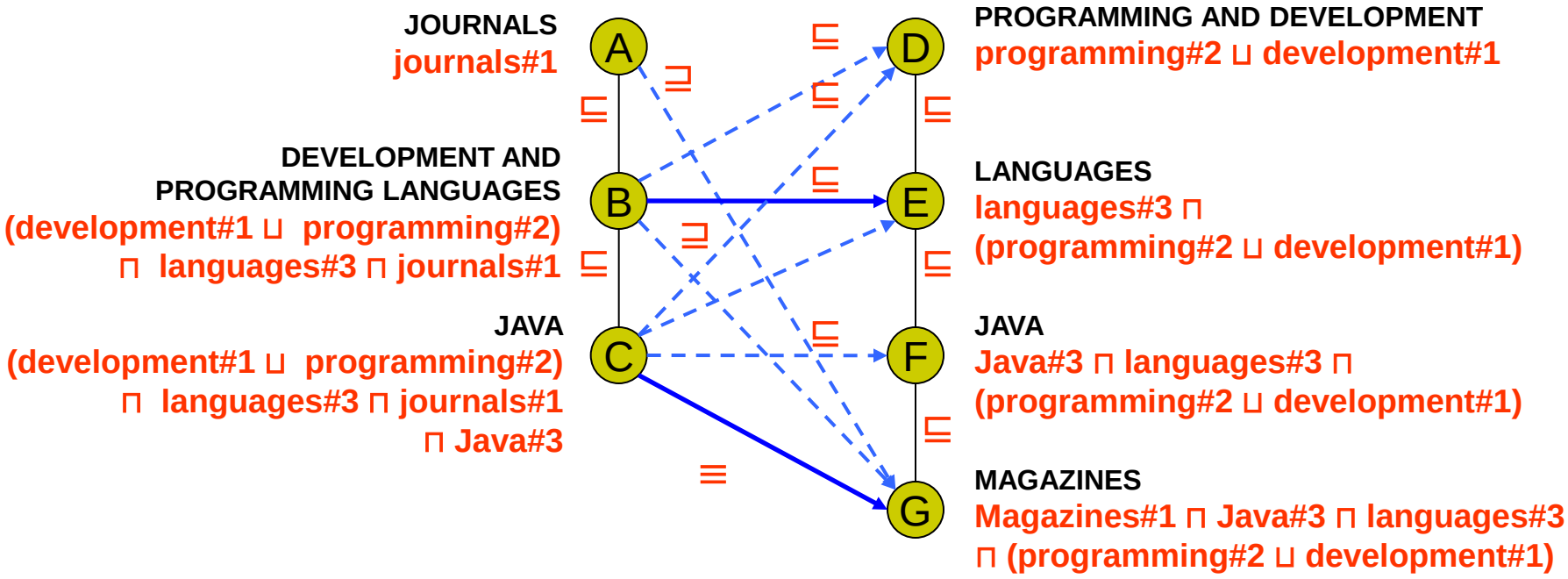


SPSM [ODBASE-08a]

- SPSM: Structure Preserving Semantic Matching
  - Example with two web services:
    - **Get_Wine**(Region, Country, Color, Price, Number_of _bottles)
    - **Get_Wine**(**Region**(Country, Area), Colour, Cost, Year, Quantity)
    - SPSM (T1,T2) = 0.62 + set of mapping elements
  - Uses abstraction operations to preserve structures, namely it computes one-to-one correspondence, such that:
    - Functions are matched to functions
    - Variables are matched to variables
  - Outputs a global similarity measure and a set mapping elements.
  - Node matching is done with S-Match
  - A global similarity measure is computed using Tree edit distance

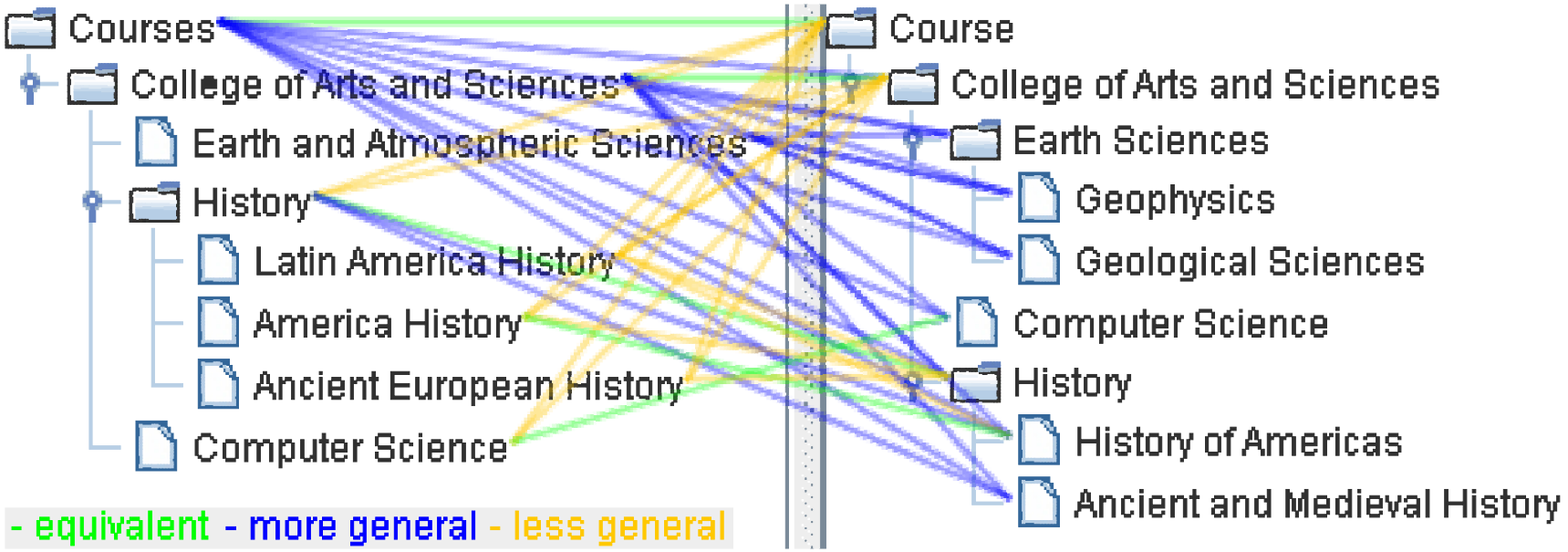
MinSMatch [ODBASE-10]

- Based on a set of redundancy patterns the minimal mapping is that minimal subset of correspondences such as all the others can be efficiently computed from them
- The minimal mapping always exists and it is unique



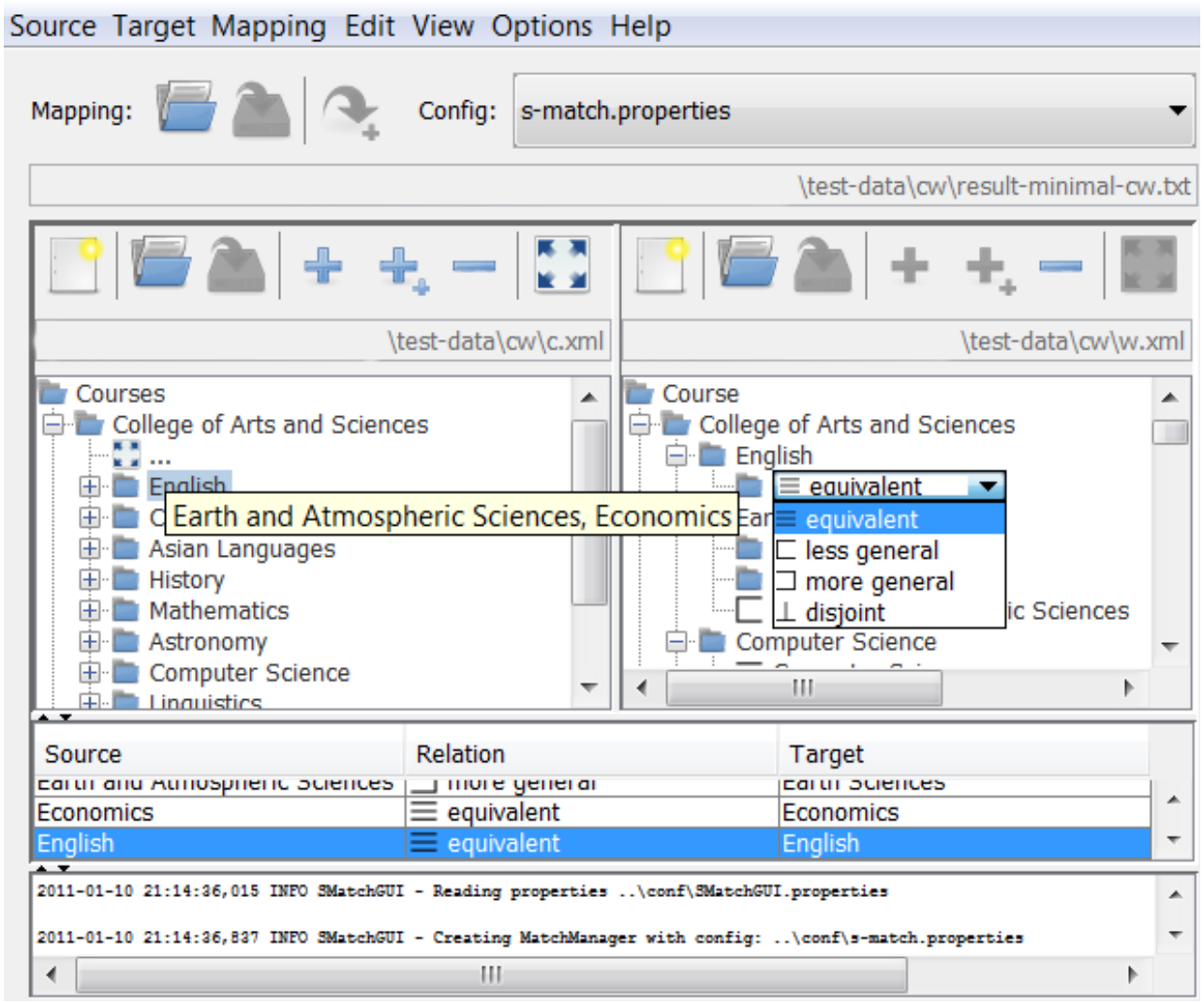
S-Match GUI [SWJ-10]

- **Traditional visualization:** crowded already with only 34x39 nodes



S-Match GUI [SWJ-10]

- New GUI
  - node-links
  - ellipsis
  - hints
  - path-to-root
  - links table
  - editing
  - synchronized navigation



MinSMatch Evaluation [ODBASE-10]

Mapping sizes and percentage of reduction on standard datasets

Datasets (nodes)	Mapping of maximum size	Minimal Mapping size	Reduction (%)
#1 Cornell/Washington (34/39)	223	36	83.86
#2 Topia/Icon (542/999)	5491	243	95.57
#3 Web dir. Source/Target (2857/6628)	282648	30956	89.05
#4 EClass/UNSPSC (3358/5293)	39818	12754	67.97

Reduction in run time and calls to SAT

	Run Time (ms)			Calls to logical reasoner (SAT)		
#	S-Match	MinSMatch	Reduction (%)	S-Match	MinSMatch	Reduction (%)
1	472	397	15.88	3978	2273	42.86
2	141040	67125	52.40	1624374	616371	62.05
3	3593058	1847252	48.58	56808588	19246095	66.12
4	6440952	2642064	58.98	53321682	17961866	66.31

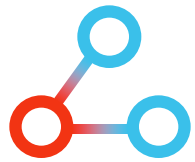
MinSMatch Evaluation [ODBASE-10]

Mapping sizes and percentage of reduction on NALT and LCSH

Id	Source	Branch
A	NALT	Chemistry and Physics
B	NALT	Natural Resources, Earth and Environmental Sciences
C	LCSH	Chemical Elements
D	LCSH	Chemicals
E	LCSH	Management
F	LCSH	Natural resources

Branches	Mapping of maximum size	Minimal mapping size	Reduction (%)
A vs. C	17716	7541	57,43
A vs. D	139121	994	99,29
A vs. E	9579	1254	86,91
B vs. F	27191	1232	95,47

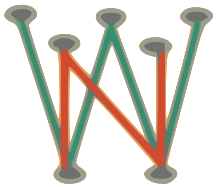
Improved NLP [ISWC-07, ECDL-10]



- Classifications, database schemas, APIs…
- Natural Language Metadata: labels, very short pieces of text
  - short context to no context
  - special syntax tools
  - biased toward nouns distribution of parts of speech
- Improved NLP: manual annotation + language analysis
  - tokenization
  - parts of speech tagging
  - lightweight parsing: simple NP-based grammar
- +18% in translation accuracy

Improved BK [ECAI-06, ISWC-10]

- BK: Background Knowledge
  - **WordNet**
    - http://wordnet.princeton.edu
    - general, small, single language
    - ~120K concepts, covers daily language
  - **GeoWordNet**
    - http://geowordnet.semanticmatching.org/
    - specific, huge, several languages
    - ~3.6M+ entities, 7.2M+ relations, world places
  - **Entitypedia**
    - http://entitypedia.org/
    - general, huge, multilingual,
    - covers world entities and domains, coming soon…

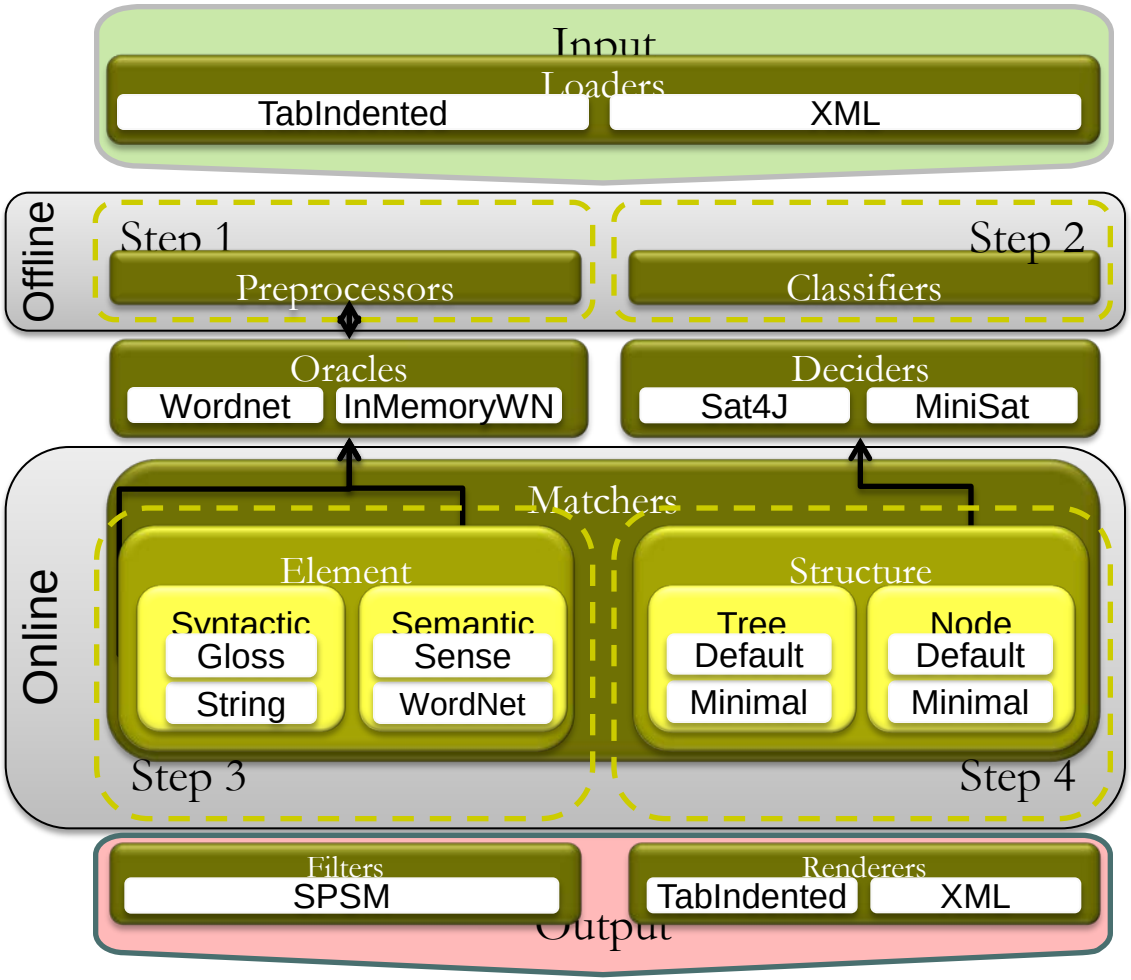


Open Source Framework [SM, SWJ-10]

- **http://semanticmatching.org/** since March 2010

- SF.net community
- Source Code
- Documentation
- Data sets

- LGPL
- CC-BY
- almost 2000 dls



Exploitation

Semantic Geo-Catalog (SGC)

S-Match is used to match a user query to a faceted ontology in the geo-spatial domain

Experiments in the agriculture domain

S-Match to match AGROVOC with CABI

Interconcept

MinSMatch to match Knowledge Organization Systems in digital libraries

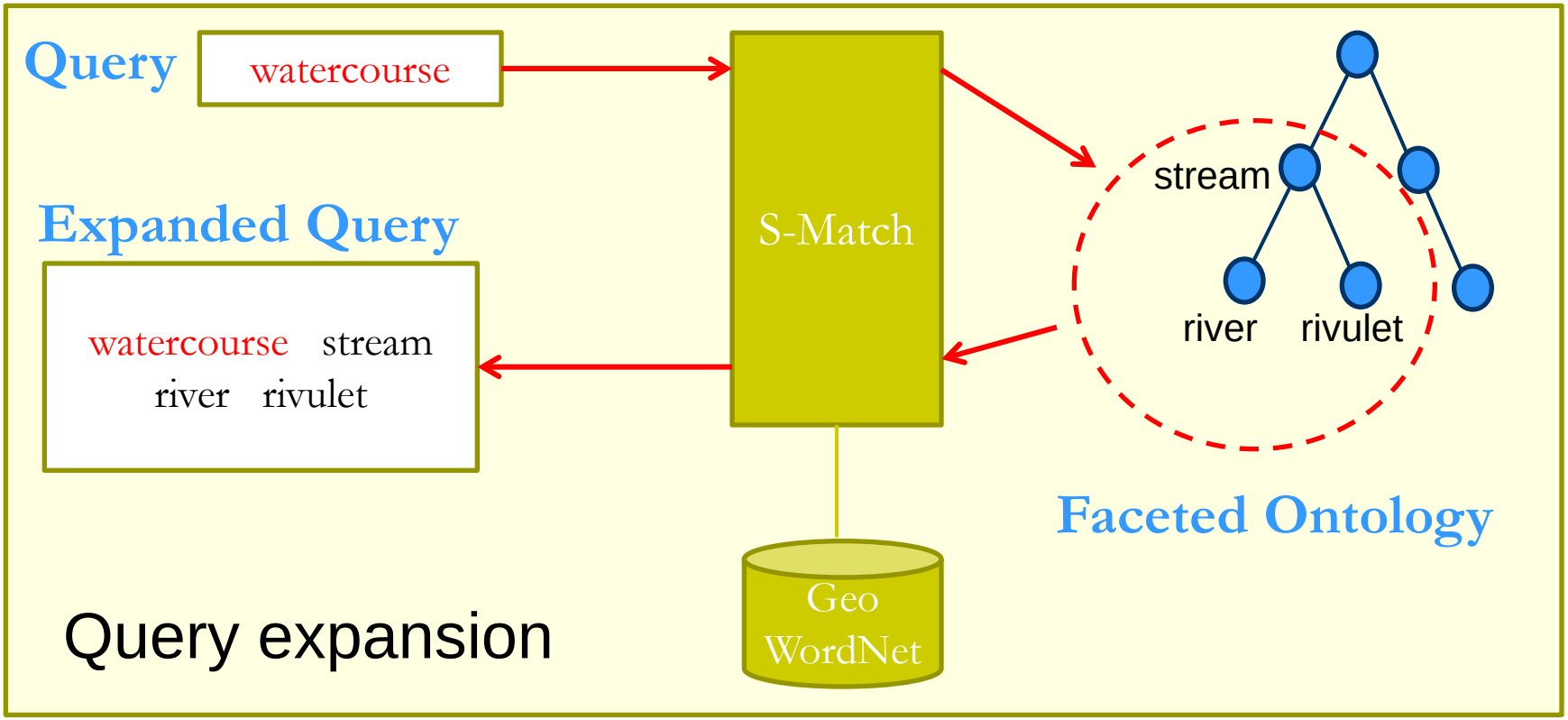
Open Knowledge

SPSM to match web services

And others …




Semantic Geo-Catalog [ESWC-11]



- The query expansion component integrated with the geo-catalog
- The local dataset of the Province of Trento has been used to construct the faceted ontology and integrated with GeoWordNet

Semantic Matching: Theory and Practice

- by Fausto Giunchiglia and Aliaksandr Autayeu
- end 2011 - beginning 2012

- Fundamentals
  - Introduction to Semantic Matching
  - Lightweight Ontologies
  - Basic Algorithm
  - Structure Preserving Semantic Matching
  - Minimal Semantic Matching
  - Non-Standard Uses of Matching
- The Framework
  - Introduction to the S-Match
  - Input: Everything is a Tree
  - Processing Natural Language Metadata
  - Background Knowledge
- ... The Framework
  - …
  - Background Knowledge
  - Element-level Matching
  - Structure-level Matching
  - Advanced Matching
  - Output: Semantic Mappings
  - Framework Extensions
- Datasets and Evaluation
  - Evaluation Issues and Methodology
  - Datasets
  - Evaluating Conversion into Lightweight Ontologies
  - Evaluating Matching Techniques

Other Relevant Initiatives

- OAEI: Ontology Alignment Evaluation Initiative
  - since 2004, supported by
    - Pavel Shvaiko, Mikalai Yatskevich, Juan Pane
  - http://oaei.ontologymatching.org/
- Ontology Matching Workshop at ISWC
  - since 2006, supported by
    - Pavel Shvaiko, Fausto Giunchiglia
  - http://om2011.ontologymatching.org/
- Book on Ontology matching [OMB-07]
  - In 2007, by Pavel Shvaiko and others

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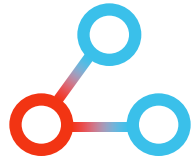
The Right Matching Tool for the Task at Hand



Thank you for your time and interest!

Questions?

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