Embedded Benchmarking and Expert Authoring for Ontology Mapping and Alignment Generation



Daniel Sonntag

German Research Center for Artificial Intelligence, Saarbrücken, Germany daniel.sonntag@dfki.de

Introduction

We propose an extendable evaluation method for exploring ontology matching performances. The tests are embedded into a semantic search architecture and allow to build tests with new datasets, new alignment input, or new individual matching algorithm as expert authoring environment. Expert users are involved by generating test cases, supervising initial alignments and parameters to the matching process and by combining matchers into global matching methods.

Features

· Interactive ontology matching and alignment generation by user-friendly and editable HTML test cases:

· Ontology mapping for domain-specific applications;

· State-of-the-art ontology mapping research should includes the development of scalable methods by

- combining methods; and

- tools for supporting users to tackle the interoperability problem between distributed knowledge sources. ->

Convenient editors for iterative, semiautomatic mapping

Embedded **Benchmarking Tests in Search Architecture**

Interactive Semantic Mediation for for basically three purposes:

1. Interactive benchmark tests on similarity matching algorithms and pipelines; 2. Interactive definition of relevant user feedback:

3. Interactive alignment generation for further use



local methods by top-down se Four tables are generated for a



logies and the in



THESEUS

omposite Ontology Matching Pipeline ented a special Fe-Do-Fitture (Do-FittureFordinalacityFlooding) in order to a the atternet inner for string-bases and structure-bases mapping. In a some to some (order-barlfo)/orSindartsFlooding) for building the Sindarity

redback DoF

arSimilarityFlooding and File fotorVehicle rdb Jontolo

areas User_Threshold: a real vak (the similarity test (see 5th column)

of the supervised t d in **Base**. This allow ents (the "-1" thread are considered va " in Grey is an exam

necestingnese													
Matching_Terro_A	Matching_Term_B	User_Threshold	User_Expectation	SmiarityValue(ActualOutput()	(Valuation()	precision()	recall()	f1Measure()	getTraePositive()	gefIrueNegative()	getFalsePositive()	getFalseNegative)
MotorVehicle	Kraffahrzeug	0.7	1	0	0	false	0	0	0	0.0	0.0	1.0	0.0
Person	Mensch	0.7	1	0	0	false	0	0	0	0.0	0.0	2.0	0.0
MiniVan	Mehrzweckfahrzeug	0.7	0	0	0	true	0	0	0	0.0	1.0	2.0	0.0
Van	ParoengerVehicle	0.7	1	0	0	false	0	0	0	0.0	1.0	3.0	0.0
Passenger Vehicle	Passenger Vehicle	0.7	1	1		true	0.25	1	0.400	1.0	1.0	3.0	0.0
Passenger Vehicle	Lastwagen	0.7	0	0	0	true	0.25	1	0.400	1.0	2.0	3.0	0.0
Vas	Lastwagen	0.7	0	0	0	true	0.25	1	0.400	1.0	3.0	3.0	0.0
MinVat	Car	-1	1	0		true	0.400	1	0.571	2.0	3.0	3.0	0.0
Passenger Vehicle	Lartkraftwagen	0.7	0	0	0	true	0.400	1	0.571	2.0	4.0	3.0	0.0
Track	Lastwagen	0.7	1	0	0	false	0.333	1	0.500	2.0	4.0	4.0	0.0
Treck	Lastkraftwages.	-1		0		true	0.429	1	0.600	3.0	4.0	4.0	0.0
Van	Lartkraftwagen	0.7	0	0	0	true	0.429	1	0.600	3.0	5.0	4.0	0.0
Track	PassengerVehicle	0.7	0	0	0	true	0.429	1	0.600	3.0	6.0	4.0	0.0
MotorVehicle	Mensch	0.7	0	0	0	true	0.429	1	0.600	3.0	7.0	4.0	0.0
Person	Kraffahrzeug	0.7	0	0	0	true	0.429	1	0.600	3.0	8.0	4.0	0.0
MotorVehicle	PassengerVehicle	0.5	1	0.559		true	0.5	1	0.667	4.0	8.0	4.0	0.0
MotorVehicle	Lastwagen	0.7	1	0	0	faise	0.444	1	0.615	4.0	8.0	5.0	0.0
Darranger Vahirla	Frakfahrning	.1		0		Irea	0.5		0.667			5.0	
Vas	Kraffahrzeug	0.7	1	0	0	false	0.455	1	0.625	5.0	8.0	6.0	0.0
Passenger Vehicle	Mehrzweckfahrzeug	0.7	1	0	0	failse	0.417	1	0.589	5.0	8.0	7.0	0.0
Van	Mehrzweckfahrzeug			0		true	0.462	1	0.632	6.0	8.0	7.0	0.0
Treck	Mehrzweckfahrzeug		0	0	0	true	0.462	1	0.632	6.0	9.0	7.0	0.0
MiniVan	Lastkraftwagen.		0	0	0	true	0.462	1	0.632	6.0	10.0	7.0	0.0
MasVan	Lastwagen	0.7	0	0	0	true	0.462	1	0.632	6.0	11.0	7.0	0.0
MinVat	Passenger Vehicle	0.7	1	0	0	false	0.429	1	0.600	6.0	11.0	8.0	0.0
Van	Car	-1		0		true	0.467	1	0.637	7.0	11.0	8.0	0.0
Passenger Vehicle	Car	-1		0	1	true	0.5	1	0.667	8.0	11.0	8.0	0.0
Treck	Car	0.7	0	0	0	true	0.5	1	0.667	8.0	12.0	8.0	0.0

dowing table the same terms as before are used as input (th dwite floodies is seeled instand of must bound industry)."

-more --t use evanances measures remain comparable among composite matching workflow. The user can, however, also is in the matchinglantyFloodingTest. This can be particular of the composer mathew on neuronal version. Any

akeSindarityFl	ordingTest												
atching Term_A	Matching Term B	User_Threshold	User_Expectation	SimilarityValue()	ActualOutput()	Valuation()	precision()	recal()	flMearare()	getTratFontive()	getTrueNegative()	getFalzePositive()	getFalceNegatio
otorVehicle		0.7	1	1	1	trie	1	1	1	1.0	0.0	0.0	0.0
rson	Mensch	0.7		0.914		tree				2.0	0.0	0.0	0.0
irsVan	Mehrzweckfahrzeug	0.7	0	0.281	0	true	1	1	1	2.0	1.0	0.0	0.0
80	PassengerVehicle	0.7	1	0.153	0	faise	0.667	1	0.800	2.0	1.0	1.0	0.0
storager Vehicle	PassengerVehicle	0.7		0.990	1	true	0.75	1	0.857	3.0	1.0	1.0	0.0
usengerVehicle	Lastwagen	0.7	0	0.101	0	true	0.75	1	0.857	3.0	2.0	1.0	0.0
80	Lastwagen	0.7	0	0.101	0	tree	0.75	1	0.857	3.0	3.0	1.0	0.0
auVan	Car	0.7		0.165	0	false	0.600	1	0.750	3.0	3.0	2.0	0.0
usengerVehicle	Lasticativagen	0.7	0	0.0790	0	true	0.600	1	0.750	3.0	4.0	2.0	0.0
wik.	Lastwagen	0.7		0.0390	0	faise	0.5	1	0.667	3.0	4.0	3.0	0.0
ack.	Latkraftwagen	0.7		0.106	0	false	0.429	1	0.600	3.0	4.0	4.0	0.0
n	Lasticraftwagen	0.7	0	0.0790	0	trie	0.429	1	0.600	3.0	5.0	4.0	0.0
иk	PassengerVehicle	0.7	0	0.0790	0	tree	0.429	1	0.600	3.0	6.0	4.0	0.0
storVehicle	Menach	0.7	0	0.449	0	true	0.429	1	0.600	3.0	7.0	4.0	0.0
1200	Keattishezwag	0.7	0	0.449	0	tree	0.429	1	0.600	3.0	8.0	4.0	0.0
storVehicle	PassengerVehicle	0.7		0.464	0	faire	0.375	1	0.545	3.0	8.0	5.0	0.0
otorVehicle	Lastwagen	0.7	1	0.170	0	false	0.333	1	0.500	3.0	8.0	6.0	0.0
ssengerVehicle	Kraftfahrzwag	0.7		0.171	0	faise	0.300	1	0.462	3.0	8.0	7.0	0.0
6	Kraftishezwag	0.7		0.171	0	faire	0.273	1	0.429	3.0	8.0	8.0	0.0
isenser Vehicle	Mehrweckfahrzeus	0.7		0.110	0	false	0.25	1	0.400	3.0	8.0	9.0	0.0
n	Mehrzweckfahrzeug	0.7	1	0.110	0	failse	0.231	1	0.375	3.0	8.0	10.0	0.0
uck.	Mehrnweckfahrzeug	0.7	0	0.110	0	true	0.231		0.375	3.0	9.0	10.0	0.0
n/Van		0.7	0	0.114	0	true	0.231	1	0.375	3.0	10.0	10.0	0.0
nVa.	Lastwagen	0.7	0	0.114	0	tree	0.231	1	0.375	3.0	11.0	10.0	0.0
raVan	PaarengerVebicle	0.7		0.114	0	falze	0.214	1	0.353	3.0	11.0	11.0	0.0
n	Car	0.7	1	0.111	0	faire	0.200	1	0.333	3.0	11.0	12.0	0.0
ssengerVehicle	Car	0.7		0.111	0	faire	0.188	1	0.316	3.0	11.0	13.0	0.0
ack.	Car	0.7	0	0.0840	0	true	0.188	1	0.316	3.0	12.0	13.0	0.0

uk44-standalone\intostrus/THESEUSSbinaBasedSmilarity and SimilarityFlooding posters late

Enabling Technologies

Publicly available testing and matching software can be used.

Open Source Software	Description
Fit (http://fit.c2.com/)	TT is a framework for integrated testing. A test case is written in table in an HTML file, so that no programming skills are needed for editing A programmer writes a program which uses the test case's input an checks whether or not the expected output is computed. In our testing cases, we use the main FTT library.
itNesse	
http://www.bandxi.com/fitnesse/)	We make use of this extended version of FIT as a testing tool. This extension can be used as a plugin in Eclipse (whereby the procedure o writing the test cases and the respective programs remains the same as in FIT).
Phaselibs	
http://phaselibs.opendfki.de)	First, this programming platform supports custom combinations of al- gorithms. Second, it is entirely written in Java which allows us to di- rectly integrate the API with the expert authoring environment based on FIT. Third, the API supports individual modules and libraries for ontol- ogy adapters, similarity measures (e.g., string based, instance based, or graph based), and alignment generators.

Henene	2,02,0	right	veorg	kgnored	exceptore	depred
TestTengiale.Mail		17	8		0	0.3
fest hini		- 22	0			26.9
StringBasedSimilarityText_MedicoFMA_RadLec_01.html		5	0	0		0.3
StingBasedSimilarity and SimilarityFlooding html		35	21		0	2.9
SynglesedbulartsTex, MedcoPMA, Radley, Mail		24	13	0	0	6.4
Rongbased limitetty Test. Mail		151	100	6		0.9
TestNedice_JCD9_VCEyrsphonae.html			0		1 22	
StrigBasedSimilarity_and_SimilarityFlooding_2.html		16	20	0		2.7
Province/Industs and Sedart-Flooders restars. Med						

Evaluation Procedure

You can use input from, e.g., visual ontology matching tools to create test tables

The expert user is involved in the specification of the test cases and provides suggestions on mappings. This makes the process of creating and validating mappings interactive and personalised to experts or expert groups.

Load and exchange ontologies to match and write supervised benchmark cases.

The user knows about the functional primitives which correspond to functions of a Java API.

Supervise intermediate results, interpret incremental precision, recall, and F measure values, and sequentially combine matchers (which also may require input alignments)

The second matching phase benefits from pre-compiling the first alignment. Users can add comments; a summary is generated.

Conclusion

We described a tool for ontology mapping and alignment generation.

In this way, we increase the transparency and usability of an incremental ontology matching process. The method should be particularly useful in cases where, in response to industry requirements, a collection of reference test sets is not available.

<?xml version="1.0"?>
<rdf:RDF xmlns;j.0="http://km.opendfki.de/PHASE#"
xmlns:rdf=Thtp://wnw.wo.org/1999/02/22-rdf-syntax-ns#">
,0:ProposedMappingsList>

-ddtib-dib-dib-proposedMappingEquab-dib-proposedMappingEquab-dib-proposedMappingEquab-dib-proposedMappingEquab-ddtib-proposedMappingEquab-

</j.0:ProposedMappingsList> </rdf:RDF>

References

[1] Marc Ehrig, Steffen Staab, and York Sure. Bootstrapping ontology alignment methods with APFEL. In WWW '05: Special interest tracks and posters of the 14th international conference on World Wide Web, pages 1148–1149, New York, NY, USA, 2005. ACM.

[2] Sean M. Falconer, Natalya Noy, and Margaret-Anne D. Storey. Towards understanding the needs of cognitive support for ontology mapping. In Pavel Shvaiko, Jefforme Euzenat, Natalya Fridman Noy, Heiner Stuckenschmidt, V. Richard Benjamins, and Michael Uschold, editors, CEUR Workshop Proceedings, CEUR-NS.org.

[3] George G. Robertson, Mary P. Czerwinski, and John E. Churchill. Visualization of mappings between schemas. In CHI '05: Proceedings of the SIGCHI conference on Human factors in computing systems, pages 431–439, New York, NY, USA, 2005. ACM.

[4] Daniel Sonntag. Towards dialogue-based interactive semantic mediation in the medical domain. In Pavel Shvako, Jérôme Eurant, Fausto Giunchiglia, and Heiner Stuckenschmidt, editors, Proceedings of the Third International Workshop on Ontology Matching (OM-2008), CEUR Workshop Proceeding, CEUR-WS.org, 2008.

Daniel Sonntag, Embedded Benchmarking and Expert Authoring for Ontology Mapping and Alignment Generation, FOIS 2008

This research is supported by the German Federal Ministry of Economics and Technology under the grant number 01MQ07016 (THESEUS). The responsibility for this publication lies with the author

THESEU THESEU THESEU THESEU THESEU THESEU