An Unsupervised Ontology Matching System Using Outlier Analysis

Master Thesis

presented by Alexander Mller Matriculation Number 1376818

submitted to the Chair of Information Systems V Prof. .Dr. Heiko Paulheim University Mannheim

Mai 2015

Contents

1	Intr	oduction	1			
	1.1	Overcoming the Disparate Data Space	1			
	1.2	Contributions	1			
2	The Ontology Matching Problem 2					
	2.1	Definitions	2			
		2.1.1 Ontologies	2			
		2.1.2 Ontology Matching	4			
	2.2	Motivating Example	8			
	2.3	State-of-the Art	8			
		2.3.1 Bibliography Benchmark	9			
		2.3.2 Conference	9			
		2.3.3 Anatomy	10			
		2.3.4 Library	10			
	2.4	Challenges	13			
3	Ontology Matching Approaches (Related Work)					
	3.1	Classification of Approaches	15			
	3.2	Individual Matchers	15			
		3.2.1 Element-level Matchers	15			
		3.2.2 Structure-level Matchers	16			
	3.3	Matching Combination Techniques	17			
	3.4	Analysis Combination Techniques	17			
4	Sele	cted Approaches to Outlier Analysis (Related Work)	18			
	4.1	Definition Outlier Analysis	18			
	4.2	Approaches	18			
5	Anı	unsupervised Ontology Matching System using Outlier Analysis	19			
	5.1	Motivation for using Outlier Analysis for Ontology Matching	19			
	5.2	Ontology Matching as an Outlier Detection Problem	19			
		5.2.1 Creating the Feature Vector	19			
		5.2.2 Significance of Outliers for Ontology Matching	19			
		5.2.3 Transforming the Outlier Analysis Result to a Matching .	19			

6	$\mathbf{A} \mathbf{M}$	latching Pipeline using Outlier Detection	20
	6.1	Overview	20
	6.2	Individual Matchers used	20
	6.3	Feature Selection	20
	6.4	Outlier Analysis to Combine the Results	20
7	Eva	luation	21
	7.1	Datasets	21
		7.1.1 Conference	21
		7.1.2 Benchmark	21
		7.1.3 Anatomy	21
		7.1.4 Library	21
	7.2	Experimental Setup	21
	7.3	Used Baselines	21
	7.4	Results	21
8	Disc	eussion	22
	8.1	Flexibility towards changing Data Domains	22
	8.2	Runtime Considerations	22
	8.3	Comparison with current OAEI Participants	22
9	Con	clusion	23