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Ontology Based Business Rules Extraction Model & Algorithm (OBBREMA)

نموذج وخوارزمية استخراج قواعد الأعمال باستخدام الأنتولوجى

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Thesis Approval

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Dedication

*To my parents, who guided me to success with their wisdom,
To my husband, who supports and stands beside me,
To my kids, who I hope this thesis will be a motivation for them,
To my brothers and sisters,
To my colleagues and friends at Al-Quds University*

Maha Fawzy

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed

Maha Fawzy Osrof

Date: 11/6 /2011

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Abstract

Software Engineers and developers need Business Rules to complete analysis process and developing applications consequently. Business Rule is a statement that defines or constrains some aspect of the business. Extracting Business Rules from legacy systems is a difficult process, since Business Rules are hidden in the code. And legacy systems keep changing all the time. In addition to that, many steps are needed to extract Business Rules from large systems, and it is not worthy in small systems. We suggest in this thesis to use Ontology, as a conceptual model that represent Business Rules expressively, for extracting Business Rules to solve extraction problems. First of all, we did a mapping using analysis and comparison between Business Rules Categories and Ontology Concepts to determine what exactly to extract. The case studies show how Ontology represents expressive and real world Business Rules and they help us in determining relationships between Ontology concepts. Our own case study was implemented in the qualified teacher domain, where we applied different types of Business Rules to implement the mapping.

Then we propose the Ontology Based Business Rules Extraction Model (OBBREM) that extracts Business Rules from Ontology depending on our one to one mapping and the case studies.

Finally we propose a translation for our model into an extraction algorithm Ontology Based Business Rules Extraction Algorithm (OBBREA) using backtracking analysis for the case studies. This algorithm helps in extracting Business Rules from Ontology in expressive way to help software engineers and analysts in the analysis process. Also this algorithm can be implemented with a parser in the future to fulfill the extraction from Web Ontology Language (OWL) code.

المخلص

يحتاج مهندسى البرمجيات ومطورى البرامج لقواعد الأعمال لاتمام عملية التحليل وتطوير التطبيقات المعمول بها. قواعد الأعمال هى التى تعرف وتحدد جوانب وشروط العمل. ان استخلاص قواعد الأعمال من الأنظمة القديمة المتوارثة عملية صعبة، لأن قواعد الأعمال تكون مخفية فى كود البرامج، كما أن الأنظمة المتوارثة تتغير طيلة الوقت. بالاضافة لذلك يلزم العديد من الخطوات لاستخلاص قواعد الأعمال من الأنظمة الكبيرة وهى عملية لا تستحق الجهد فى الأنظمة الصغيرة.

نقترح فى هذه الأطروحة استخدام الأنتولوجى -كنموذج مفاهيمى يمثل قواعد الأعمال بطريقة معبرة- لاستخلاص قواعد الأعمال مما يساعد فى حل مشاكل استخلاصها. فى البدء عملنا مقابلة بين تصنيفات قواعد الأعمال ومفاهيم الأنتولوجى لمعرفة ماذا سيتم استخلاصه بالضبط، حيث وجدنا مقابل كل تصنيف لقواعد الأعمال مفهوم يقابله فى الأنتولوجى نتيجة لعملية التحليل والمقارنة بين الطرفين.

ثم بينا فى الحالات الدراسية كيف تمثل الأنتولوجى قواعد الأعمال بطريقة معبرة وواقعية، ومن ضمن الحالات الدراسية الحالة التى نفذناها فى مجال المعلمين المؤهلين وتم تطبيق أنواع مختلفة من قواعد الأعمال فيها لتنفيذ عملية المقابلة مع الأنتولوجى. ولقد ساعدت هذه الحالات الدراسية فى معرفة العلاقات التى تربط مفاهيم الأنتولوجى -التي نريد استخلاصها- ببعضها البعض. ثم قدمنا نموذج لاستخلاص قواعد الأعمال باستخدام الأنتولوجى يعتمد على المقابلة الأحادية-مفهوم مقابل مفهوم- السابقة والحالات الدراسية فى عملية استنتاج نموذج الاستخلاص. وفى النهاية قدمنا ترجمة لنموذجنا من خلال خوارزمية لاستخلاص قواعد الأعمال باستخدام الأنتولوجى تساعد فى استخلاص قواعد الأعمال بطريقة معبرة تساعد مهندسى البرمجيات والمحللين فى عملية التحليل وذلك بتطبيق تحليل باكتراكنج على الحالات الدراسية. وأيضا يمكن تنفيذ هذه الخوارزمية مع بارسر فى المستقبل لاتمام عملية الاستخلاص من لغة OWL البرمجة فى الأنتولوجى.

Table of Contents

Contents

Chapter 1.....	1
Problems in Business Rules Extraction and Motivations	1
1.1 Introduction	1
1.2 Problem Statement	1
1.3 Problems in Extracting Business Rules.....	2
1.4 Potential Uses of the Extracted Business Rules	3
1.5 Conclusion	4
Chapter 2.....	5
Literature Review	5
2.1 Introduction	5
2.2 Business Rules Literature	5
2.3 Ontology Literature.....	7
2.4 Conclusion	10
Chapter 3.....	11
Theoretical Framework.....	11
3.1 Introduction	11
3.2 Business Rules Definition	11
3.2.1 Business Rules Categories.....	12
3.2.2 Types of Business Rule:	13
3.3 Ontology Definition.....	14
3.3.1 Developing an Ontology.....	15
3.3.2 Why developing an Ontology?.....	15
3.4 What is OWL?.....	18
Chapter 4.....	19
Mapping Business Rules Categories to Ontology Concepts.....	19
4.1 Introduction	19
4.2 Mapping Business Terms to Ontology Concepts (Classes).....	19
4.3 Mapping Facts relating terms to each other to Ontology Object Properties	20
4.4 Mapping Constraints to Ontology Restrictions & Necessary and Sufficient Conditions.....	26

4.5 Mapping Derivations to Ontology Closure Axioms	28
4.6 Mapping Summary Table	29
4.7 Conclusion	30
Chapter 5.....	31
Case Studies	31
5.1 Introduction	31
5.2 Qualified Teacher Ontology	31
5.2.1 Qualified Teacher Main Classes	32
5.2.2 Object Properties and Quantifier Restrictions.....	37
5.2.3 Cardinality Restrictions & Necessary and Sufficient Conditions.....	38
5.2.4 Value Partition.....	44
5.2.5 Data Properties	49
5.2.6 A Closure Axiom and Covering Axiom.....	51
5.3 Pizza Ontology.....	53
5.3.1 Classes and Subclasses	53
5.3.2 Object Properties	53
5.3.3 Datatype Properties	54
5.3.4 has Value Restrictions	56
5.3.5 Cardinality Restrictions	57
5.3.6 Quantifier Restrictions	57
5.3.7 Value Partitions.....	58
5.3.8 Covering Axiom and Closure Axiom	58
5.4 Family Ontology	59
5.4.1 Classes and Subclasses.....	60
5.4.2 Object Properties	60
5.4.3 Datatype properties	61
5.4.4 hasValue Restrictions	61
5.4.5 Cardinality Restrictions	62
5.4.6 Quantifier Restrictions	62
5.4.7 Value Partitions.....	62
5.4.8 Covering Axiom and Closure Axiom	62
5.5 Conclusion.....	63

Chapter 6.....	64
Ontology-Based Business Rules Extraction Model & Algorithm	64
6.1 Introduction	64
6.2 Ontology Based Business Rules Extraction Model (OBBREM)	65
6.3 Ontology Based Business Rules Extraction Algorithm (OBBERA).....	70
6.4 Future Work	75
References	76

List of Tables

Table No	Table Name	Page
Table 4.1:	Mapping Business Rules Concepts To Ontology Concepts.....	29

List of Figures

Figure No.	Figure Name	Page
Figure 4.1 :	First Case of N-ary Relationship.....	22
Figure 4.2 :	Second Case of N-ary Relationship.....	23
Figure 4.3 :	Third Case of N-ary Relationship.....	24
Figure 4.4 :	Fourth Case of N-ary Relationship.....	25
Figure 5.1 :	Teacher Ontology Main Classes.....	32
Figure 5.2 :	Teacher Categories.....	33
Figure 5.3 :	AfterSchoolTeacher Category (Class).....	34
Figure 5.4 :	Business Rules for AfterSchoolTeacher Class.....	36
Figure 5.5 :	Inherited Object Properties for Subclasses of Teacher Class.....	36
Figure 5.6 :	Object Properties For Teacher Class.....	38
Figure 5.7 :	Necessary and Sufficient Conditions to Define KindergardenTeacher Class.....	39
Figure 5.8 :	Necessary and Sufficient Conditions for LowBasicLevelTeacher Class.....	39
Figure 5.9 :	Difference between Necessary Conditions and Necessary & Sufficient Conditions.....	40
Figure 5.10:	HighBasicLevelTeacher Subclasses.....	41
Figure 5.11:	Business Rules for HighBasicLevelTeacherProgramA Subclass.....	41
Figure 5.12:	Business Rules for HighBasicLevelTeacherProgramB Class.....	42
Figure 5.13:	Business Rules for KindergardenTeacher Class.....	42
Figure 5.14:	Business Rules for LowBasicLevelTeacher Class.....	43
Figure 5.15:	Business Rules for SecondaryT eacher Class.....	43
Figure 5.16:	Business Rules for ExpertTeacher Class.....	45
Figure 5.17:	Business Rules for NoviceTeacher Class.....	45
Figure 5.18:	Subclasses for Certificate Class.....	46

Figure No.	Figure Name	Page
Figure 5.19:	Subclasses for Grade Class.....	47
Figure 5.20:	Subclasses for Level Class.....	48
Figure 5.21:	Subclasses for Subject Class.....	48
Figure 5.22:	Attributes at individuals level.....	49
Figure 5.23:	Attributes at class level.....	50
Figure 5.24:	Expert Teacher Attribute (hasyearsofexperience) range.....	50
Figure 5.25:	Novice teacher Attribute (hasyearsofexperience) range.....	51
Figure 5.26:	A closure Axiom for Secondary Teacher (11-12) Level.....	52
Figure 5.27:	Covering Axiom for class PromotionValue.....	52
Figure 5.28:	Pizza Ontology Classes.....	53
Figure 5.29:	Object Properties for Cheesey Pizza Class.....	54
Figure 5.30	Data Properties at Individual Level.....	55
Figure 5.31	Data Properties at Class Level.....	55
Figure 5.32	Data Property Restriction.....	56
Figure 5.33	HasValue Restriction.....	56
Figure 5.34	Minimum Cardinality Restriction.....	57
Figure 5.35	Quantifier Restrictions.....	58
Figure 5.36	Spiciness Value Partion.....	58
Figure 5.37	Spiciness Covering Axiom.....	59
Figure 5.38	Margherita Closure Axiom.....	59
Figure 5.39	Classes and Subclasses of Family Ontology.....	60
Figure 5.40	hasParent Object Property.....	61
Figure 5.41	hasValue Restriction.....	61

Figure No.	Figure Name	Page
Figure 5.42	Minimum Cardinality Restriction.....	62
Figure 5.43	Covering Axiom.....	63
Figure 6.1 :	Ontology Based Business Rules Extraction Model (OBBREM).....	65