Automated Business Rules Harvesting using Semantic Technology

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Abstract

We aim to present an approach that can be used for the automated identification and extraction of the business rules with the help of using semantic technology. In typical BRMS, keyword based search is used to extract required business rules from rule base. However, we aim to incorporate semantic based search for retrieving business rules according to the contextual meaning and identify context of search, location, variation of words, and synonyms. In business rules, it is defined that the constraints and rules control the behavior of the business for achieving the goal of any organization. One can apply business rules in the form of constraints, definition and operations. All the strategies and directions tell the business rules that what organization should do and how to focus on a particular business activity. In Business Management controlled all the work like saving, defining, updating, retrieving, and deleting the rules. No support available still that give us accuracy of matching of word, location, intent, variation of words, synonyms, concept matching to provide relevant search result. Limitations of simple search have some issues when result is published after a query. Most popular techniques are called stemming but it has some draw backs because it focuses on the root word not the meaning. In semantic based search, a search is improved by improving accuracy by searching according to the contextual meaning.

Key words: Semantic; technology; Business rules management system; Business rules harvesting

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INTRODUCTION

In a typical business organization, a large number of new decisions are made every day that affect the business. In this situation, for the sake of assistance to business analysts, BRMS (Business Rules Management System) can help in taking a business decision (Gang, 2009). These days, information is required to make correct and useful decisions especially when market conditions are constantly changing. To cop up with the modern business needs, one need to focus on increase in use of business rules in decision making process to meet constantly changing requirements, increasing productivity and reducing operational costs (Cosentino et al., 2013). In business rules, it is defined that the constraints and rules control the behavior of the business for achieving the goal of any organization. One can apply business rules in the form of constraints, definition and operations. All the strategies and directions tell the business rules that what organization should do and how to focus on a particular business activity (Van Eijndhoven et al., 2008). The main advantage of BRMS is that one can easily define business rules without in less time involvement of programming. The major role of BRMS is to find the problems, resolve it

and maintain it in an efficient manner. The most important feature of a BRMS is facilitation in complex decision making with the help of existing then business rules (Boussadi et al., 2011). Moreover, a typical BRMS can also handle inconsistencies and ambiguities in decision making process.

Rule harvesting (Balsters et al., 2008) is used to identify and document business rules. The purpose of rule harvesting is extraction of the rules that are selected from candidate. It defines the proper methodology with right tools on the legacy software and analysis the rule. Moreover, a further role of rule harvesting is help to identify that which rule have to be extracted and grouped with respect to the legacy software components that support a particular business process (Malik and Bajwa, 2012a). Different tools are used for rule harvesting because manual extraction is not feasible. However still advance tools are not give full result of rules mining (Smith et al., 2014; Malik and Bajwa, 2012b). A business rule engine is software that works to execute the business rules. The basic function of a typical business rule engine is to execute one or more business rules. It defines the relationship with different rules and verifies the consistency of rules.

Business rule engine is managing all the rules, definitions verify consistency (Weikum and Theobald, 2010).

The paper is organized as follows. Next section we describe the related work. Section 3 presents the methodology. Section 4 describes the results that are based on presented methodology. In Section 5, we summarize our conclusion and Section 6 represents the proposed future work.

MATERIALS AND METHODS

In this section the sketch of the used approach is presented that is used for adopting semantic technology to support knowledge management for automated harvesting business rules. The used approach is based on following steps in Figure 1 (Used Framework for Business Rule Extraction)

Figure 1: Proposed architecture

Source Code Parsing

Parser is software that checking for correct syntax in the process it may be by hand or may be automatically generated by a parser generator.Parsing produced formatted output. Parser is a component of an interpreter or complier and it is a key step in the complier frontend. Parser provides file reading facility such as HTML or XML text. It is a process to analyzing natural language or in computer language, string of symbols with the rules of formal grammar. The method of parsing to understand the exact meaning of a sentence and with emphasizes the importance of grammatical divisions.

Generate Abstract Syntax Tree

Abstract Syntax Tree (AST) is a representation of the abstract syntactic structure of source code that written in programming language. In this tree each node use for construct occurring in the source code. In AST for avoiding ambiguity is use context free grammar. In inner workings of AST function perform unique on the syntax analysis stage. In this stage complier produce a parse tree which used to perform all function of compiler by means of syntax directed translation. With the use of AST during in semantic analysis that checks the correct usage of elements in the program by complier. For verification and correctness of program during semantic analysis the complier generates symbol tables based on AST.

Traverse Abstract Syntax Tree

Abstract syntax tree is like a complier and serves as a representation of a computer program. There are many applications that need to traverse the abstract tree. In implementation traversals can over the abstract data type with recursive function. After semantic analysis in traverse abstract syntax tree merge terminals into parents processing repeated this left to right as much as u can. Before you apply the function in the root of the children firstly walk the tree and evaluate the children.

Extract Business rules

The extracting essential business logic in the form of business rules from a legacy software application is called rules mining (Weikum and Theobald, 2010) in business term. The goal of extraction in business to capture legacy business rules for controlling and changing the business rules over time. It supports business rules approach for formal way of managing an organization business rules. Both manual and automated approaches are used for extracting the rules.

Rule Verification

In semantic technology meanings encode separately from content files and data, and also separately from application code. In semantic technologies' adding, implementing with changing new relationships as well as people to understand share with at execution time (Filipowska et al., 2011). Semantic technologies included auto recognition of concept, categorization, information and meaning extraction.

Rules Engine

In rule engine that execute one or more business rules at runtime environment with the help of rule engine software system (Chaudhri and Bajwa, 2012). In business rules system used for operational decisions to be tested, executed and maintained these are company policies and rules engine support rules, mutual exclusion, priorities, define, classify

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and manage all rules and check verify consistency of rules.

Data Repository: Data repository term generally is used for data storage and also partitioning of data where data stored together (Polpinij et al., 2015). It is also called data warehousing. In data base warehouse all business information are include historical data of the business organization. In data repository is keeping different kind of data together.

Generate Business rules

In business the rules are captures from the business rules model that apply to a business process. Before the produce the result from the process the actual processing that take to apply the rules from business rules model. Using the enterprise architect model wizard generate the model structure and initial components.

Business rules repository

The purpose of business rules repository (Smith et al., 2014) is the support to business rules information. The information is need of direct or indirect of all stakeholders. In managing of business rules require a business rules repository. If business rules manage as a logical and physical system then must be business rule management function. Repository of business rules support requirements of all business, query, and web based applications and rule related information.

RESULTS

In this session, the detail of an experiment is provided that is performed to test the performance of the designed framework elicited in session III. This session is concluded with the results of the experiment. We use the case study (Automated Business rules Software System) (Malik and Bajwa, 2012a) for implementation to fetch out the results. In Figure 2 (Coding of rule statement).

Figure 2: Example code

In this figure 2 rules describe in coding of java statement. In this coding use if statement for verify of business rules. Two or many condition is used in if statement after the true of condition the function comes into body another function of while. Which are work under the if statement.

After the while condition is true the call applied function executes and if while condition is false then else part of if statement will execute that is reject function.
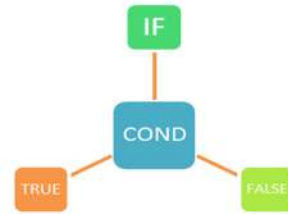

Figure 3: Abstract syntax tree

In Figure 3 shows the tree of rules. In the graph have nodes the represents the rules according the conditions. The benefits of tree graph represent and describe in simple way. In this tree all condition represents in node and in the graph nodes have two sides which perform according to the condition. With according to condition node comes top to bottom and left to right.

Verify Results: (In Table-1 & Figure 4)

Complete condition in rules:

- Qualification is equal to metric.
- Experience is equal to 2 years.

Incompletion Rules

- Age is less than 15 year.
- C.N.I.C card is mandatory

Table 1: Results of the experiments

Example	Core Segments	Total Rules	Extract	Non Extract	Percentage
1	2	6	5	1	88%
2	3	8	7	1	90%
3	3	9	7	2	80%

Figure 4: Results of the experiments

In business rules verification the first extract the business rules and verification of rules. If rules are fulfill the conditions then it generate business rules and after generating the business rules then rules will keep in business rules repository and save the rules in repository. But if verification of rules comes false then it comes in manual verification for correctness of rules manually.

The four conditions checked and verified with business rules. The two rules verified but another two rules are incorrect which are fulfilling the conditions. Because the first condition is qualification is equal to metric and with two year experienced is checked condition with the rules but another two conditions are against the rules because if anybody get a qualification equal to metric and he have 2 years experienced then after experienced his age is approximately 17 years so this is impossible to complete the rules and also the another rules against the standardization because CNIC is made after the age of 18 years. So for the correctness of condition is use manual verification.

CONCLUSION

Automated business rules harvesting using semantic technology used in business organization for extraction of business rules automatically. When submit the data in business rules software it checks the condition with rules. Firstly it extracts business rules using semantic technology then verifies the business rules. After with the help of semantic technology verify the business rules. The next step after verification it generates the business rules. When the business rules generated it keeps in data repository. If rules are not verified with the condition then it correct manually and keep again in data repository then after the submitted of requirements. In business rules verification the first extract the business rules and verification of rules. If rules are fulfill the conditions then it generate business rules and after generating the business rules then rules will keep in business rules repository and save the rules in repository. But if verification of rules comes false then it comes in manual verification for correctness of rules manually. So at the end the result of automated business rules harvesting using semantic technology still no generate complete automated business rules. It also gets a help of manually correctness of rules.

The future of semantic technology, that is on the possible impacts of this research. A number of researches that is available to automated business rules harvesting using semantic technology with different aspects. Many experts still working to explore the vision of semantic technology for well-structured the specification of business rules. With the passage of time, propose future work is the automatically dynamic generate the requirement business rules with the great impact. Include their different classes, entities, attributes and relationship. That is very helpful in the modeling of natural language and semantic technology.

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