A Tableau Algorithm for Handling Inconsistency in OWL*

Xiaowang Zhang[1,2], Guohui Xiao[1], and Zuoquan Lin[1]

[1] School of Mathematical Sciences, Peking University, Beijing, China
[2] School of Mathematical Sciences, Anhui University, Hefei, China
{zxw,xgh,lzq}@is.pku.edu.cn

Abstract. In Semantic Web, the knowledge sources usually contain inconsistency because they are constantly changing and from different view points. As is well known, as based on the description logic, OWL is lack of the ability of tolerating inconsistent or incomplete data. Recently, the research in handling inconsistency in OWL becomes more and more important. In this paper, we present a paraconsistent OWL called quasi-classical OWL to handle inconsistency with holding important inference rules such as modus tollens, modus ponens, and disjunctive syllogism. We propose a terminable, sound and complete tableau algorithm to implement paraconsistent reasoning in quasi-classical OWL. In comparison with other approaches to handle inconsistency in OWL, our approach enhances the ability of reasoning by integrating paraconsistent reasoning with important classical inference rules.

1 Introduction

In recent years, the problem of inconsistency handling in OWL is attracting a lot of attention in logics and Semantic Web. Many reasons cause the occurrence of inconsistency such as modeling errors, migration from other formalisms, merging ontologies, and ontology evolution [1]. In practical reasoning, it is common to have "too much" information about some situation. In other words, it is common for there to be classically inconsistent information in practical reasoning ontologies [2]. According the fact *ex contradictione quodlibet* in classical logic, if ontologies contain inconsistencies then the classical entailment in logics is explosive. That is to say, any formula is a logical consequence of a contradiction. Therefore, conclusions drawn from an inconsistent knowledge base may be completely meaningless [3]. This is particularly important if the full power of logic-based approaches like the Web Ontology Language (short OWL) [4] shall be employed, as classical logic breaks down in the presence of inconsistent knowledge. Not surprisingly, the study of handling inconsistency in OWL becomes more and more important.

There are serval approaches to handling inconsistency in OWL, which can be generally divided into two fundamentally different approaches. The first is based on the assumption that inconsistencies indicate erroneous data which are to be repaired in order to obtain a consistent knowledge base, e.g. by selecting consistent subsets for the

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