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A Framework for Ontology Engineering with an Industrial Focus

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Introduction

Over the past few decades, Ontology Engineering has received a lot of attention, which has led to the publication of numerous works on methodologies, guidelines, tools, resources, and other things. including issues that require further investigation. Even so, when dealing with a new ontology development project, there are still a lot of unanswered questions about how to manage the project as a whole, how to explain transitions between activities, and which tasks and tools are best for each step. The overall and lightweight Linked Open Terms (LOT) methodology for building ontologies based on existing methodologies and geared toward developments and technologies in the semantic web is what we propose in this paper. In addition to academic and research projects, the LOT methodology emphasizes alignment with software development, which integrates ontology development into the software industry. It is reported that this methodology has been used on 18 projects and incorporates lessons learned from more than 20 years of ontological engineering.

Description

Although it is true that a lot of useful work has been carried out on ontology engineering over the years, such as the proposal of multiple ontology development methodologies to systematize the development process and the alignment with agile practices, as of today, there are important questions on ontology development that have not been answered, This issue has been exposed by the recent analysis of the current state, challenges and future directions in ontology engineering. The aim of the work presented in this paper is to respond to this situation and answer the questions presented in the first paragraph by proposing the Linked Open Terms (LOT) methodology, which not only presents the activities to be performed in the ontology development process, but also proposes recommendations, tips and tools to support them. The LOT methodology is based on the experience of, at least, 18 projects where ontologies have been developed, both by this paper authors and by external teams, involving both domain experts and software engineers. Our experience is also diverse in other senses, for example, there are projects where the creation of linked open data has been an important result, others where the ontology has been an objective itself, others where the ontology has been an standard schema for communication between systems, etc. In addition, one of the authors has contributed in the past to two of the most well-known methodologies for building ontologies which brings not only an extensive experience in practical matters but also a broader view and knowledge about the evolution of the ontology engineering field during the last decades. The conclusions and lessons learnt from our experience are presented here as a framework that includes both the methodological and the technological level.

The paper is structured as follows. Section presents main existing methodologies for developing ontologies. Section describes the methodological level of the LOT framework which includes the proposed activities to be performed in any ontology development process, while Section presents the software support recommended to carry out such activities. Section focuses on the validation of the methodology based on its application and comparison with existing approaches. Finally, Section concludes and presents future lines of work. Although numerous ontology development methodologies have been proposed since the 1990s, existing methodologies should be reviewed and adapted to support ontology development in the Linked Data and agile context, which are currently popular scenarios. This section provides an overview of ontology development methodologies mainly oriented to OWL ontologies.

Specifically, METHONTOLOGY defined a set of life cycle models and a development process that provided an overview of how an ontology should be developed. Moreover, it provided detailed guidelines to carry out the ontology conceptualization. The life cycle models that it proposed were waterfall, incremental (which ensures that each version is compatible with the previous ones) and one based on evolving prototypes (with essential similarities to agile development). However, from a current perspective it has some drawbacks: There are activities that are not defined in a precise way; it was focused on developing application-independent ontologies, however, currently it is usual to develop ontologies as part of a bigger software project;some of the premises associated with METHONTOLOGY are no longer valid, for instance, that the ontologies that you reuse will be stable and available forever; and there was not so much experience as now developing ontologies. [1-5].

Conclusion

There are two dependent variables and one independent variable in this GDP-based demand forecast calculation. Among the aforementioned techniques, multiple regression can solve this issue. Because of this, the multiple regression analysis method was chosen. The multiple regression model has a complicated and sensitive calculation method. To get the most accurate solution, high accuracy must be ensured. In these circumstances, manual procedures must be replaced with software that has been precisely programmed. Distributors and manufacturers can benefit from the advanced demand planning and inventory optimization provided by GMDH Streamline.

All these traditional methodologies, although they include support activities, such as evaluation, propose time and resource consuming activities to develop and evaluate ontologies instead of simple and (semi-)automatic processes, being sometimes too heavy to be applied in ontology developments. However, these methodologies are reused and proposed to be followed as part of LOT when the techniques are still applicable.

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