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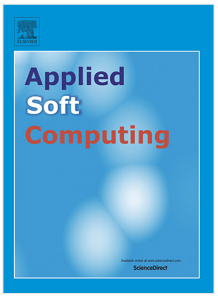

Verification of fuzzy UML models with fuzzy Description Logic

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Verification of Fuzzy UML Models with Fuzzy Description Logic

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Abstract

The fuzzy UML model has been introduced to enable the conceptual modeling of imprecise data in many applications. How to prevent, detect, and correct errors as early as possible in the modeling process by verifying the correctness of fuzzy UML models is desirable. But it is difficult to manually verify the correctness of the models. Thanks to the effective reasoning service of fuzzy Description Logics (DLs), they are considered as natural candidates for supporting the verification of fuzzy UML models. In this paper we propose a complete and practical approach for verifying fuzzy UML models with fuzzy DLs. In detail, we first propose an approach for transforming a fuzzy UML model into a fuzzy DL knowledge base. Then we further reduce the verification tasks of the fuzzy UML model to reasoning problems of the transformed fuzzy DL knowledge base. Also, the correctness of the approach is proved, and a running example is provided to explain the approach in detail. Final we implemented a prototype that can transform fuzzy UML models into fuzzy DL knowledge bases. Case studies show that the proposed approach is feasible and the prototype translator actually works. By means of our approach and tool, the transformed fuzzy DL knowledge base and reasoning tasks can be input into the existing fuzzy DL reasoners, and the reasoning results reported by the reasoners can be passed back to the designer to improve the quality of the fuzzy UML model.

Keywords:

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