

Enhancing semantic consistency in anti-fraud rule-based expert systems[☆]

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ABSTRACT

In this study, an ontology-driven approach is proposed for semantic conflict detection and classification in rule-based expert systems. It focuses on the critical case of anti-fraud rule repositories for the inspection of Card Not Present (CNP) transactions in e-commerce environments. The main motivation is to examine and curate anti-fraud rule datasets to avoid semantic conflicts that could lead the underpinning expert system to incorrectly perform, e. g., by accepting fraudulent transactions and/or by discarding harmless ones. The proposed approach is based on Web Ontology Language (OWL) and Semantic Web Rule Language (SWRL) technologies to develop an anti-fraud rule ontology and reasoning tasks, respectively. The three main contributions of this work are: first, the creation of a conceptual knowledge model for describing anti-fraud rules and their relationships; second, the development of semantic rules as conflict-resolution methods for anti-fraud expert systems; third, experimental facts are gathered to evaluate and validate the proposed model. A real-world use case in the e-commerce (e-Tourism) industry is used to explain the ontological knowledge design and its use. The experiments show that ontological approaches can effectively discover and classify conflicts in rule-based expert systems in the field of anti-fraud applications. The proposal is also applicable to other domains where knowledge rule bases are involved.

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