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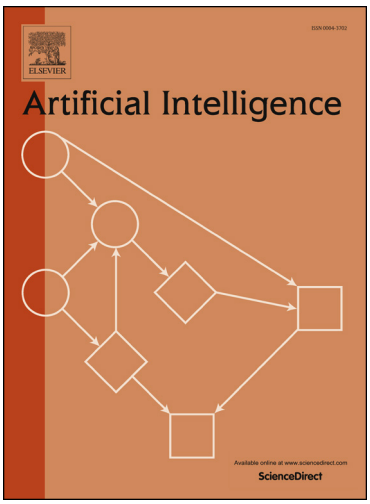

Fundamental properties of attack relations in structured argumentation with priorities

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Fundamental Properties of Attack Relations in Structured Argumentation with Priorities

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Abstract.[1]
Due to a proliferation and diversity of approaches to structured argumentation with prioritized rules, several simple and intuitive principles for characterization and evaluation of the proposed attack relations have recently been introduced in [23]. While the proposed principles and properties are helpful, they do not identify unique attack relations. Any user of structured argumentation still faces a fundamental problem of determining an appropriate attack relation for her/his application and further principles that could help in identifying such attack relation.

We argue that a key purpose of introducing priorities between defeasible rules is to remove undesired attacks while keeping the set of removed attacks to a minimum. This intuitive idea could be viewed as a kind of minimal-removal-principle. We show in this paper that the minimal-removal-principle together with a new simple and intuitive property of inconsistency-resolving and previously proposed properties indeed characterize a unique attack relation referred to as the canonical attack relation. We show that canonical attack relations could be characterized in three distinct ways, as the supremum of a complete upper-semilattice of regular attack relations, or by removing the undesired attacks from the basic attack relations where the undesired attacks are captured by a least-fixed point of an intuitive removal function, or as the normal attack relations introduced in an earlier paper for a class of well-prioritized knowledge bases.

We start our study with a language consisting only of literals and two type of attacks, rebut and undercut. We then show that our approach can easily be scaled up by showing that all key results still hold for general underlying logical languages and the inclusion of assumptions.

We apply our proposed approach to valued-based argumentation and show that it also leads to the canonical semantics.

Keywords: Structured argumentation, priorities, regular and canonical attack relations, attack removal functions, well-prioritized rule-based systems.

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