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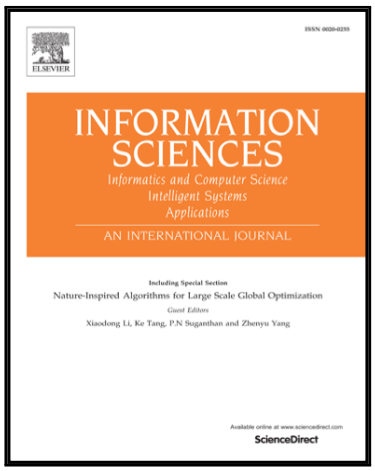


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# The clone relation of a binary relation

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**Abstract**

In a recent paper, De Baets et al. introduced the clone relation of a strict order relation. Two elements of a poset are said to be a pair of clones (or to be clones) if every other element that is greater (resp. smaller) than one of them is also greater (resp. smaller) than the other one. This clone relation played a key role in the characterization of the $L$-fuzzy tolerance relations and the $L$-fuzzy equivalence relations that a strict order relation is compatible with. In this paper, we extend the notion of clone relation to any binary relation. Although the definition of such extension is trivial, the corresponding properties significantly differ from those of the clone relation of a strict order relation. We analyse the most important ones among these properties, paying particular attention to a partition of the clone relation in terms of three different types of pairs of clones.

*Keywords:* Binary relation; Clone relation; Tolerance relation; Equivalence relation; Disjoint union.

## 1. Introduction

The clone relation of a strict order relation was recently introduced by De Baets et al. [8]. This notion is based on how elements are related w.r.t. each other in a partially ordered set (poset, for short). Two elements of a poset are said to form a pair of clones (or to be clones, for short) if every other element that is greater (resp. smaller) than one of them is also greater (resp. smaller) than

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