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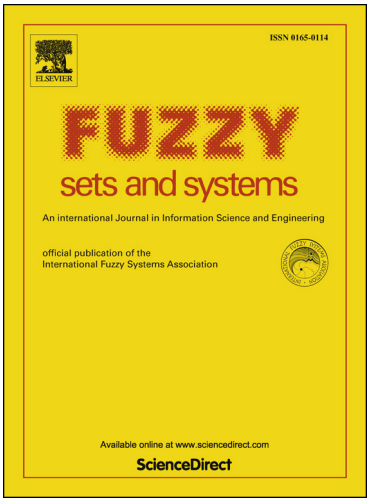

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ACCEPTED MANUSCRIPT

On the correspondence between reciprocal relations and strongly complete fuzzy relations

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Abstract

Fuzzy relations and reciprocal relations are two popular tools for representing degrees of preference. It is important to note that they carry a different semantics and cannot be equated directly. We propose a simple transformation based on implication operators that allows to establish a one-to-one correspondence between both formalisms. It sets the basis for a common framework in which properties such as transitivity can be studied and definitions belonging to different formalisms can be compared. As a byproduct, we propose a new family of upper bound functions for cycle-transitivity. Finally, we unveil some interesting equivalences between types of transitivity that were left uncompared till now.

Keywords: Fuzzy relation, reciprocal relation, cycle-transitivity, implication operator, bipolar/unipolar scale

1. Introduction

Fuzzy relations are widely used for representing degrees of preference in a decision-making context, where it is quite common that preferences cannot be stated in a clear-cut way. On the other hand, reciprocal relations are mainly encountered in probabilistic settings, where they are used to describe binary

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