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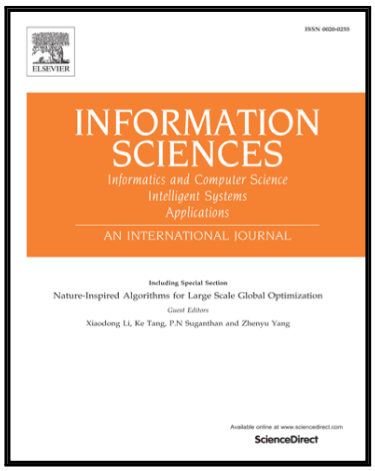

Textural Unit Operations in Rough Set Theory

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Textural Unit Operations in Rough Set Theory

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Abstract

In this study, we introduce a textural counterpart of the unit operation of Wybraniec-Skardowska. A unit di-operation has two parts which are called a unit co-operation and a unit operation, respectively. In this respect, we have two types of symmetry. We show that the symmetricity of direlations is equivalent to the Galois connectivity of unit di-operations. For discrete textures, we determine the image co-operation of a unit co-operation. We prove that the symmetricity and duality are equivalent concepts for unit di-operations if one of the compounds is symmetric. We consider definability in terms of unit operations and unit co-operations. Further, we present a categorical discussion defining a category **UN** whose structures of objects are unit operations. We show that the category **Rel** whose objects are approximation spaces and morphisms are relation preserving functions can be embedded into **UN**.

Keywords: Approximation operator, rough set, texture space, unit operation, definable set.

1. Introduction

It is well known that the lower and upper approximation operators are fundamental tools in rough set theory. They are mostly defined in terms of equivalence classes, successor or predecessor neighbourhoods with respect to a relation on the given universe. In a more general setting, the lower and upper approximations of a set can be formulated using some special mappings acting as approximation operators. In this respect, one of the remarkable concepts is the unit operation considered first by Wybraniec-Skardowska [25, 26]. Essentially,

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