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Measurement of General Granules

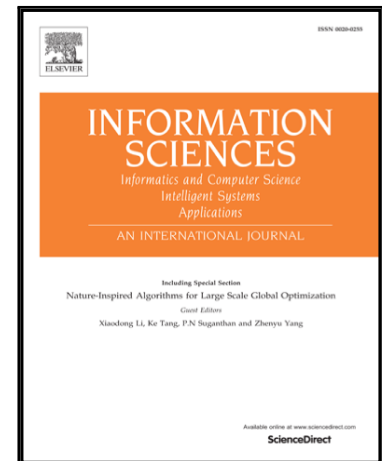
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Measurement of General Granules

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Abstract

The measurement of granules is often considered the most foundational problem in granular computing and it has been studied in many fields but in relative isolation. This paper attempts to explore the measurement for general granules, whether they are granules based on equivalence or general relations, whether they are macrocosmic or microcosmic granules, and whether they are granules on a finite or an infinite set. For a finite set we discuss the measurement of granules corresponding to equivalence relations and introduce definitions of granularity, fineness and granular entropy. In order to distinguish those granules with the same granularity, fineness and granular entropy we present conditional granularity, conditional fineness and conditional granular entropy and obtain the necessary and sufficient condition which can judge one granule as coarser or finer than another. While the conditional granularity is a subthood measure which satisfies monotonic properties. What's more, we introduce relation matrix to measure the granules, and it not only can be easily generalized to measure the granules on general relations but also connects granular computing to graph theory. For an infinite set we can define different granularities in different questions, but we suggest the basic idea of granularity, that is, the granularity of a granule is the sum of the relative information contents of its atomic granules.

Keywords:

Granularity, Conditional granularity, Subthood, Fineness, Conditional fineness, Granular entropy, Conditional granular entropy

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