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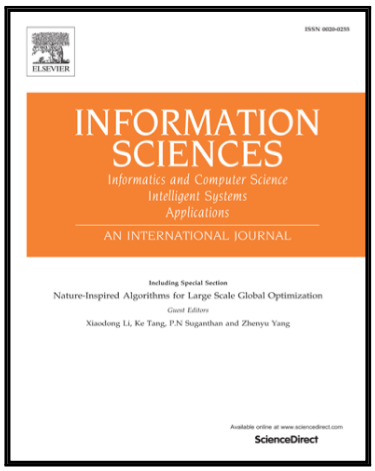

Effective Lossless Condensed Representation and Discovery of Spatial Co-location Patterns

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Effective Lossless Condensed Representation and Discovery of Spatial Co-location Patterns

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ABSTRACT: A spatial co-location pattern is a set of spatial features frequently co-occuring in nearby geographic spaces. Similar to *closed frequent itemset mining*, *closed co-location pattern (CCP) mining* was proposed for losslessly condensing large collections of prevalent co-location patterns. However, the state-of-the-art condensation methods in mining CCP are inspired by closed frequent itemset mining and do not consider the intrinsic characteristics of spatial co-locations, e.g., the participation index and ratio in spatial feature interactions, thus causing serious containment issues in CCP mining. In this paper, we propose a novel *lossless condensed representation* of prevalent co-location patterns, *Super Participation Index-closed* (*SPI-closed*) *co-location*. An efficient *SPI-closed Miner* is also proposed to effectively capture the nature of spatial co-location patterns, alongside the development of three additional pruning strategies to make the SPI-closed Miner efficient. This method captures richer feature interactions in spatial co-locations and solves the containment issues in existing CCP methods. A performance evaluation conducted on both synthetic and real-life data sets shows that SPI-closed Miner reduces the number of CCPs by up to 50%, and runs much faster than the baseline CCP mining algorithm described in the literature.

Keywords: Spatial data mining, Spatial co-location patterns, SPI-closed co-location patterns, Lossless condensed representation.

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