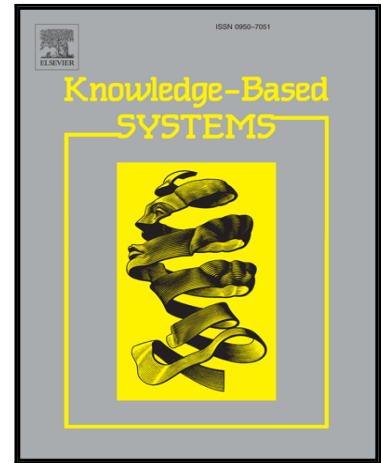


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Towards a Granular Computing Approach based on FCA for  
Discovering Periodicities in Data

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## Highlights

- Granular Computing (GrC) for discovering event periodicities in temporal data. GrC is a paradigm useful to describe and analyse data at different levels of abstraction, therefore data can be exploited to create information granules starting from both the selection of a given time unit and the construction of a set of time slots in a time interval of interest decomposed into periodic segments.
- Formal Concept Analysis (FCA) with time-related attributes to realize granulations of data with respect to periodic time slots represented as specific attributes, called temporal attributes of the formal context. Granules including temporal attributes are used to discover periodic occurrences and co-occurrences.
- A set of measures, i.e., Information Granulation (IG), Information Entropy (IE), Separation (SEP), Coverage (COV) and Specificity (SP), which can be used to assess granulation and resulting granules according to their capability to elicit useful knowledge related to periodic occurrences and co-occurrences. In brief, these measures help us discover relevant temporal occurrences and co-occurrences by guiding us across 55 multiple granulations and, within a specific granulation, to identify also the granules providing more interesting and/or unique knowledge.
- The work provides both an illustrative example and a case study realized by using a dataset related to forest fires occurred in the natural park of Montesinho (Portugal).
- The main original aspect of the proposed approach comes to the definition of a novel time-guided granulation approach including the contextualization of a set of measures useful to assess the quality of granulations with respect to the interestingness and uniqueness of the discovered knowledge related to the periodicity of occurrences and co-occurrences of events. Despite of existing works, the proposed approach helps the human operator

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