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Data mining, reasoning and incremental information retrieval through non enlargeable rectangular relation coverage

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Abstract: Association rules extraction from a binary relation as well as reasoning and information retrieval are generally based on the initial representation of the binary relation as an adjacency matrix. This presents some inconvenience in terms of space memory and knowledge organization. A coverage of a binary relation by a minimal number of non-enlargeable rectangles generally reduces memory space consumption without any loss of information. It also has the advantage of organizing objects and attributes contained in the binary relation into a conceptual representation. In this paper, we propose new algorithms to extract association rules (i.e. data mining), conclusions from initial attributes (i.e. reasoning), as well as retrieving the total objects satisfying some initial attributes, by using only the minimal coverage. Finally we propose an incremental approximate algorithm to update a binary relation organized as a set of non-enlargeable rectangles. Two main operations are mostly used during the organization process: First, separation of existing rectangles when we delete some pairs. Second, join of rectangles when common properties are discovered, after addition or removal of elements from a binary context. The objective is the minimization of the number of rectangles and the maximization of their structure. The article also raises the problems of equational modeling of the minimization