

DRule: A Density-based Approach to Discovering Quantitative Association Rules

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Association rule mining is often used to find relationships in data and has been extensively studied in the literature since its first introduction. Unfortunately, most of these methods do not work well for numerical attributes as they were developed with binary data in mind. To work around this problem, state-of-the-art quantitative association rule mining algorithms often follow the same routine in finding interesting rules: perform a mapping of the original data to boolean data and then mine the results for association rules using existing techniques. This mapping is usually done through the use of discretization methods. This approach can, however, be rather ineffective as discretization inherently implies a loss of information.

We propose a novel and intuitive method, DRULE, that can exhaustively explore the data for quantitative association rules without the need for a discretization step. Essentially, DRULE searches the data for hyper-rectangles for which it holds that the interval set by each dimension of the rectangle is dense in its dimension. An important advantage our method has over other methods is that the hyper-rectangles we find can overlap with other hyper-rectangles. The interesting regions found through this approach are then transformed, if possible, into quantitative association rules.