Mining for Association Meta-Rules: initial remarks

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Meta-learning has been widely used to improve the classifiers build from data. Single classifiers can be combined to create ensembles (using bagging or boosting), or the results of these classifiers can be used as input for a subsequent (meta)learning step (stacking). By introducing association meta-rules we adapted the stacking approach for post-processing of association rules. We propose to apply association rule mining algorithm on a set of "original" association rules obtained as a result of particular data mining task. The input to this meta-learning step will be new data, where each example encodes a single association rule; the result will be a set of association meta-rules uncovering relations between various characteristics of the original set of rules.

We will distinguish two types of association meta-rules: qualitative and quantitative. Qualitative rules will represent the meta-knowledge in the form "if original association rules contain a conjunction of literals A, then they also contain the conjunction of literals S", i.e qualitative rules have the form $A \Rightarrow S$. Quantitative rules will represent the meta-knowledge in the form "if original association rules contain a conjunction of literals A, then they have quantitative characteristics Q", i.e quantitative rules have the form $A \Rightarrow Q$, where Q can be e.g "confidence $\in [0.9, 1]$".

To find association meta-rules, standard association rule mining algorithms can be used. The only thing to do is to represent the original association rules as input data for such an algorithm. Qualitative characteristics can be encoded either using binary attributes, where each attribute represents one possible literal or using the attributes from the original data set, quantitative characteristics can be encoded using numerical attributes that must be discretized in advance. We carried out our initial experiments using Weka but plan to use LISp-Miner as well.

We expect that the association meta-rules can help to better understand and interpret the results of association rule mining.