Good Relations with R

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Relations are a very fundamental mathematical concept: well-known examples include the linear order defined on the set of integers, the equivalence relation, notions of preference relations used in economics and political sciences, etc. A k-ary (finite) relation is defined by its *domain*, a k-tuple of sets, and its *graph*, a set of k-tuples. Package **relations** provides data structures along with common basic operations for relations and relation ensembles (collections of relations with the same domain). In doing so, it builds on the infrastructure for (generalized and customizable) sets and tuples provided by package **sets**. Package **relations** also features various relational algebra-like operations, such as projection, selection, and joins. In addition, many relations can be visualized by means of Hasse diagrams (see Figure 1). Finally, it contains algorithms for finding suitable consensus relations for given relation ensembles, including the constructive approaches of Borda, Condorcet and Copeland, as well as optimization-based methods which minimize the aggregate symmetric difference distance between the ensemble members and their consensus. We show how relations can be obtained and manipulated, and how the functionality in the package can be employed to rank the results of benchmarking experiments.

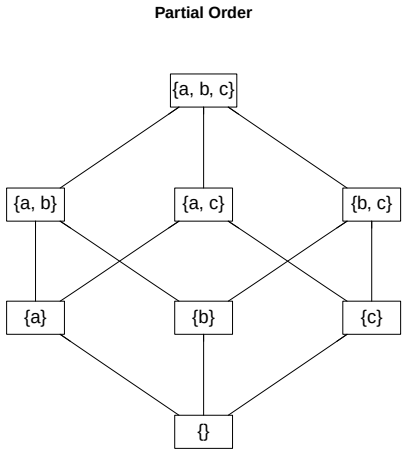

Figure 1: Hasse Diagram of the inclusion relation on the power set of $\{a, b, c\}$.

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