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Hierarchies and weak-hierarchies as interval convexities

P. Bertrand and J. Diatta

There are several ways to characterize a hierarchy, one being a collection of nonempty subsets that are convex according to a type of interval function. This characterization in terms of interval convexity, extends to general classes of multilevel clusterings, thus providing a unifying theoretical framework [1, 2]. We expand this line of research, with a special attention to specifications allowing the capture of clusterings usually constructed in data mining practice, such as the Apresjan and the single-link hierarchies. We propose: (a) New characterizations of hierarchies and weak hierarchies as interval convexities, (b) Interval functions which induce known clustering schemes such as the Single Link hierarchy or the Apresjan hierarchy, (c) A sequence of nested families of interval convexities that is gradually increasing from the Apresjan hierarchy to the Single-Link hierarchy, which enables the detection of redundant clusters.

Keywords: weak hierarchy, interval convexity, Single Link hierarchy

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