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Multilevel clustering models and dissimilarities

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Overlapping clustering is a clustering structure in which objects may belong to more than one cluster. New multilevel clustering models, which were mostly introduced during the 1980's, include overlapping clusters and extend the well-known Benzecri-Johnson bijection. This talk is concerned with the characterization of such various multilevel clustering models within the framework of general convexity. Along this line, both the paired hierarchical model and the k-weakly hierarchical models for k≥3, are characterized as interval convexities. Sufficient conditions are provided for an interval convexity to be either hierarchical, paired hierarchical, pyramidal, weakly hierarchical or k-weakly hierarchical. In addition, an algorithm is introduced for computing the interval convexity induced by any given interval operator. A general clustering algorithm is then derived to build any of the previously considered multilevel clustering models. This approach is illustrated by considering specific parameterized interval operators, that can be defined from any dissimilarity index, and selected in an adaptive way.

Biography

Patrice Bertrand received his PhD Degree in Applied Mathematics in 1986 from the University Paris-IX Dauphine. He is currently an Associate Professor at University Paris-Dauphine. From 1992 to 2013, he was a Research Collaborator at the French National Institute for Computer Science and Applied Mathematics. His research interests focus on ordered sets, clustering structures that extend the classical hierarchical model and allow overlapping clusters, and clustering evaluation. He has authored a number of research papers in international journals and conferences. He was the Scientific Secretary of the International Federation of Classification Societies (IFCS) from 2011 to 2013.

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