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Tree-penalized TSP: A hybrid objective function for linear data ordering.

Understanding the structural relationship in the given data can greatly facilitate data analysis and decision making. Many tools, like multidimensional scaling and hierarchical clustering have been developed and used for this purpose. Seriation is another method. Given a sample of n objects and the corresponding dissimilarity matrix, seriation aims to produce a linear ordering of the objects. One uses the ordering to produce a heat map visualization of the reordered dissimilarity matrix and thus understand the structure of the data. Good orderings should reflect the underlying data structure and result in heat maps that allow for clear interpretation of the data structure. There have been developed a substantial number of seriation methods. Which methods produce good orderings? Some seriation methods consistently produce orderings that are more helpful for understanding and visualization of the structure of data than other methods. In this paper we introduce a new seriation method, called tree-penalized TSP (tpTSP), which compares favorably with other considered methods. Hybrid in nature, the method benefits from the strengths of two popular types of seriation methods, TSP and Optimal Leaf Order, but avoids their key pitfalls. (Received September 16, 2019)