SDR simplex: a framework for evaluating diversity-related structural properties in ecological data

János Podani[a]

Department of Plant Ecology, Systematics and Theoretical Biology
Eötvös University, Budapest, Hungary
podani@ludens.elte.hu

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Abstract: The ecological literature abounds in measures developed for evaluating community data, including diversity, (dis)similarity, and nestedness coefficients. I show that many of these functions fit a common conceptual and methodological framework which produces two-dimensional simplex plots for visual interpretation and percentage contributions for quantification. The essence of the approach is to decompose pairwise site dissimilarity into difference (D) and replacement (R) components and to use similarity (S) as a contrast, based on either presence-absence (Podani and Schmera 211) or abundance (Podani et al. 2013) data matrices with sites as columns and species as rows. The method is invariant to matrix ordering which means that results reflect truly inherent structural properties in the data. The SDR simplex approach can be extended to analyse bipartite ecological networks (Podani et al. submitted) or any other systems that may be described by rectangular data matrices. Further extensions include the comparison of data matrices regardless of their actual dimensions and the visualization of data structures obtained by various null models to enhance interpretation of statistical tests. The approach is illustrated by applications to actual data representing a wide range of ecological communities and biogeographic systems.

References

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