Finding the mjor descriptors of species networks

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Abstract

TODO

Blah blah blah [1]

*“It is incumbent on network ecologists to establish clearly the independence and uniqueness of the descriptive metrics used.”* - [2]

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| Table 1: An informative caption about the different network properties

| Label | Definition | “Function” | Reference (for maths), can make footnotes probs |
| --- | --- | --- | --- |
| Basal | Percentage of basal taxa, defined as species who have a vulnerability of zero |  |  |
| Connectance | $L/S^{2}$, where $S$ is the number of species and $L$ the number of links |  |  |
| Cannibal | Percentage of species that are cannibals |  |  |
| ChLen | Mean food chain length, averaged over all species (where a food chain is defined as a continuous path from a ‘basal’ to a ‘top’ species) |  |  |
| ChSD | Standard deviation of ChLen |  |  |
| ChNum | log number of food chains |  |  |
| Clust | mean clustering coefficient (probability that two taxa linked to the same taxon are also linked) |  | **TODO** |
| GenSD | Normalized standard deviation of generality of a species standardized by $L/S$ |  | [3] |
| Herbivore | Percentage of herbivores plus detritivores (taxa that feed only on basal taxa) |  |  |
| Intermediate | Percentage of intermediate taxa (with both consumers and resources) |  |  |
| LinkSD | Normalized standard deviation of links (number of consumers plus resources per taxon) |  |  |
| Loop | Percentage of taxa in loops (food chains in which a taxon occurs twice) |  |  |
| L/S | links per species |  |  |
| MaxSim | Mean of the maximum trophic similarity of each taxon to other taxa, the number of predators and prey shared by a pair of species divided by their total number of predators and prey |  | **TODO** |
| Omnivory | Percentage of omnivores (taxa that feed on $\geq $ 2 taxa with different trophic levels) |  |  |
| Path | characteristic path length, the mean shortest food chain length between species pairs |  |  |
| Richness | Number of nodes in the network |  |  |
| TL | Prey-weighted trophic level averaged across taxa |  | [4] |
| Top | Percentage of top taxa (taxa without consumers) |  |  |
| VulSD | Normalized standard deviation of vulnerability of a species standardized by $L/S$ |  |  |
| Links | The number of links in the network |  |  |
| Diameter | Diameter can also be measured as the average of the distances between each pair of nodes in the network |  | [5] |
| $ρ$ | Spectral radius is a a conceptual analog to nestedness (and more appropriate for unipartite networks). It is defined as the absolute value of the largest real part of the eigenvalues of the *undirected* adjacency matrix |  | [6] |
| Complexity | SVD complexity of a network, defined as the Pielou entropy of its singular values | Something about structural v behavioural complexity being captured | [7] |
| Centrality | Centrality is a measure of how ‘influential’ a species is, under various definitions of ‘influence’… | Centrality can help in quantifying the importance of species in a network |  |
| S1 | Number of linear chains |  | [8] [9] |
| S2 | Number of omnivory motifs |  | [8] [9] |
| S4 | Number of apparent competition motifs |  | [8] [9] |
| S5 | Number of direct competition motifs |  | [8] [9] |
| Intervality |  |  | **TODO** [10] |

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| Table 2: Here is a table showing the correlation of the different network properties with the first three dimensions of the PCA

| Property | PCA 1 (27%) | PCA 2 (24%) | PCA 3 (11%) |
| --- | --- | --- | --- |
| richness | **0.8** | 0.46 | -0.11 |
| links | **0.89** | 0.14 | -0.16 |
| connectance | 0.05 | -0.9 | 0.02 |
| diameter | **0.81** | -0.06 | 0.14 |
| complexity | -0.28 | 0.48 | 0.41 |
| distance | 0.41 | 0.13 | -0.03 |
| basal | -0.29 | 0.38 | -0.73 |
| top | -0.24 | 0.59 | 0.55 |
| intermediate | 0.4 | -0.68 | 0.32 |
| herbivory | -0.29 | 0.51 | 0.13 |
| omnivory | 0.52 | -0.71 | 0.18 |
| cannibal | 0.29 | -0.72 | -0.19 |
| l\_S | **0.78** | -0.33 | -0.18 |
| GenSD | -0.1 | 0.42 | -0.80 |
| VulSD | -0.05 | **0.76** | 0.31 |
| TL | 0.59 | -0.13 | 0.39 |
| ChLen | 0.17 | 0.45 | 0.30 |
| ChSD | 0.42 | 0.05 | 0.15 |
| ChNum | 0.19 | **0.69** | 0.42 |
| path | 0.66 | 0.09 | 0.17 |
| LinkSD | 0.04 | 0.63 | -0.54 |
| S1 | **0.82** | 0.29 | 0.00 |
| S2 | **0.84** | 0.12 | -0.06 |
| S4 | **0.74** | 0.43 | -0.13 |
| S5 | **0.76** | 0.39 | -0.22 |
| ρ | 0.14 | -0.82 | -0.24 |
| centrality | -0.49 | -0.29 | 0.21 |
| loops | 0.45 | 0.12 | 0.07 |

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Source: [Article Notebook](https://BecksLab.github.io/ms_feature_selection/index.qmd.html)



VERMAAT networks only



All networks. Vermaat subset = using only the structural measures from Vermaat

# References

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