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The E-I index uncovered: On reference values and significance testing

The E-I index, defined as the number of between-group (external) minus the number of within-group (internal) edges divided by the total number of edges in a network, is widely used as a measure of homophily in social network analysis. Smaller values of the E-I index indicate greater homophily. Permutation tests are commonly used to test hypotheses involving the E-I index. We will demonstrate that the results of these tests are often misinterpreted and present an analytical expression for the null distribution of the E-I index in random graphs with a given group distribution and a specified number of edges. Using the classical dataset on the information flow between organizations, collected by Knoke and Wood in 1978, we argue the importance of selecting the correct reference value for E-I index interpretation and how the choice of null distribution can impact the results of significance tests. We discuss how our results extend to E-I indices that measure homophily at the group and individual level.

Keywords/Topics

E-I index homophily permutation test random networks

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