

Assessing the consistency of community structure in complex networks

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In recent years, community structure has emerged as a key component of complex network analysis. As more data has been collected, researchers have begun investigating changing community structure across multiple networks. Several methods exist to analyze changing communities, but most of these are limited to evolution of a single network over time. In addition, most of the existing methods are more concerned with change at the community level than at the level of the individual node. In this paper, we introduce scaled inclusivity, which is a method to quantify the change in community structure across networks. Scaled inclusivity evaluates the consistency of the classification of every node in a network independently. In addition, the method can be applied cross-sectionally as well as longitudinally. In this paper, we calculate the scaled inclusivity for a set of simulated networks of United States cities and a set of real networks consisting of teams that play in the top division of American college football. We found that scaled inclusivity yields reasonable results for the consistency of individual nodes in both sets of networks. We propose that scaled inclusivity may provide a useful way to quantify the change in a network's community structure.

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