

Hierarchical screening of topological scales in complex networks

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The detection of the modular structure of networks is of utmost importance in the analysis of real networked systems. Most of the methods proposed to detect this structural organization, are based on the optimization of a quality function called modularity whose analogy with the minimization of the hamiltonian of a generalized Potts model has been previously reported. Optimizing modularity or minimizing the equivalent hamiltonian, poses an intrinsic drawback. In the presence of different topological scales of organization, the modularity function can not account for all them separately, incurring in an in-

correct grouping of nodes, this effect has been called resolution limit. Here, we present a hierarchical method to unravel the modular structure of complex networks optimizing modularity. The method overcomes the resolution limit of modularity based schemes. The performance of the new method is proved in synthetic and real networks. The results are in good agreement with the real organization of networks at different topological scales.

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