A new method for the detection of communities in higher order networks

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Abstract

Network Science has grown and developed in recent years in various directions arising from its many practical applications, becoming one of the hottest and most successful research fields, with interdisciplinary applications in areas as different as systems biology, artificial intelligence, meteorology, engineering or cybersecurity [3, 4, 6].

As there are many contexts and situations in which it is not possible to represent the relationships between the different components of a system in terms of pairwise interactions (networks), the concept of hypergraph (or higher-order network) appears naturally to represent models of systems involving higher-than-two-order interactions [1, 2].

The communities of nodes of a network with high-order interactions (hypergraphs) are formed by groups of nodes that share many hyper-edges, so that the number of hyper-edges they share with the rest of the nodes is significantly smaller, so that these communities can be considered as independent compartments of the high-order graph.

Several methods have been proposed for the localization of communities in hypergraphs [5]. In this talk we will present a new method, based on the definition of a derived graph associated to a hypergraph, which allows to detect the communities of a high-order graph without high computational cost.

References

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