

Playing games on graphs: Co-evolution of co-operative behavior and community structure in strategic games on social networks

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Abstract:

Complex socio-economic interactions between agents, each of whom can have a set of objectives and use complicated strategies in order to achieve them, can be approximated by games such as the Prisoners Dilemma. While two-person games can give us insight on the conditions under which co-operation can emerge even when defection seems to be the best strategy, in real life, agents interact with many other agents connected to it in a complex social network. One of the striking features observed in social networks is its modular structure, i.e., the existence of communities whose members are densely connected to each other, and relatively sparsely to members of other communities. In this talk, we explore the consequences of such a network property on the emergence of co-operation in social games. As co-operation builds trust, which is one of the primary requirements for the development of complex societies and trade-exchange mechanisms, we propose a co-evolutionary mechanism by which community structure itself evolved through being conducive to the robustness of co-operation, making it more likely for agents to form links with other agents who have co-operated with them in the past.