Approximations for dynamics of networks

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Complex networks have been ubiquitously used to model problems from various disciplines. Treating a complex system as a network, a set of discrete nodes and links, leads to a conceptual simplification that often allows subsequent analytical insight that provides a deep understanding. For many questions the networks of interest are not static entities but change in time due to the dynamics of and on the network. In the dynamics of networks, the network itself is regarded as a dynamical system. Network models in general and adaptive networks in particular provide a powerful framework to model, analyze, and eventually understand a wide range of self-organization phenomena.

A direct microscopic description of dynamical networks generally constitutes a very high-dimensional dynamical system. While in some cases exact analytical results were nevertheless obtained [3], there are presently no approaches that are generally applicable. Much of the theoretical progress therefore relies on the derivation of reasonably low-dimensional coarse-grained approximations to the full microscopic model [1].

The goal of this work will be to get introduced to these new approximation techniques by analyzing the adaptive voter model [2].

References

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