The Evaluation of epidemiological models using Complex Network

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Abstract:
An applied mathematician loves small parameter because of the hope that the solution of a problem with a small parameter might be approximated by an asymptotic representation. One of the interesting properties of nonlinear dynamical systems is that arbitrarily small changes in parameter values can induce qualitative changes in behavior. The changes are called bifurcations, and they are typically visualized by plotting asymptotic dynamics against a parameter. In some cases, the resulting bifurcation diagram is unique: irrespective of initial conditions, the same dynamical sequence obtains. In other cases, initial conditions do matter, and there are coexisting sequences. As a side-efect, producing the full set of consistent parameter ε illustrates the sensitivity of the model ODE with respect to data contamination. This kind information is usually out of reach for classical methods, which must rely on local techniques based on the boundary function methods. If the parameter ε tends to zero, we have a deterministic system for which various effective numerical methods exist. One can believe that if parameter ε is sufficiently small, i.e., the system (P_{ε}) is sufficiently close to the deterministic one, it is also possible to obtain effective methods taking into account that ε is small.

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