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Rethinking the Lotka-Volterra model

Even though it was introduced almost 100 years ago, the Lotka-Volterra model is still a topic of very active research in the field of dynamics of complex systems and theoretical ecology. For some years now, it has been recognized that ideas from theoretical ecology can be applied to finance, economy, and in general systems where agents can have interactions similar to ecological ones. In fact, leaving the purely scientific curiosity aside, in recent years there has been a push for the use of agent based models (ABM's) in real economic scenarios. While this certainly has important advantages, it has at least one obvious issue. More complex models have lots of more parameters and lots of more possible behaviors. Considering the Lotka-Volterra as a minimal model of complex dynamics, we study two different variations with tools from statistical physics of disordered systems. By simplifying into a few numbers of degrees of freedom, we show how this approach can help shed light into the behaviour of complex models like these ones.