Electronic counterpart to ecological models revealed

March 24 2016

Predicting the future from the present - that's what logistic maps can do. For example, they can be used to predict the evolution of a population in the near future based on its present situation. They are relevant when studing systems such as entire populations, where the behaviour of the separate units - which have the ability to self-organise - cannot explain the behaviour of the system as a whole. Alexandre L'Her from the University of the Republic, Montevideo, Uruguay, and colleagues have now developed an electronic version of a logistic map that is capable of interacting with many other maps, making the model scalable. As a benchmark to explain new emerging behaviours of entire complex systems, they have studied networks of logistic maps coupled together at

various levels.

Their findings were recently published in *EPJ B* and make it possible to more easily compare previous computer simulations with experimental results obtained using this state-of-the art electronic model.

Previously, networks of logistic maps allowed ecologists to address the influence of diversity and spatial heterogeneity in competing populations. And logistic maps have not only been used in ecological models; since 1976 they have also been proposed as a model for various other applications, such as a noise generator or an encryption machine for secure communication, among many others.

In this study, the authors put forward an electronic version of a logistic map designed to interact with other maps. Employing low-cost components with low power consumption, it can also precisely control noise and key parameters, such as heterogeneities and random fluctuations. This makes it uniquely suited for accurately representing the characteristics of real-world systems. After running the network of electronic logistic maps, the authors calibrated numerical simulations, allowing them to extrapolate findings beyond the mere experimental results.

More information: Alexandre L'Her et al. Electronically-implemented coupled logistic maps, *The European Physical Journal B* (2016). DOI: 10.1140/epjb/e2016-60986-8

Provided by Springer