Organized Chaos: A User's Manual

@wenm0tt

Oct 23 2022

0.1 Introduction

Named 'The Best Logistic Map Discovery Since Feigenbaum's Constant' by an anonymous source, *@wenm0tt's* "Organized Chaos: A Demonstration" breaks new ground in the field of Non-Linear Dynamics. What has he discovered, exactly? The answer: the most concise, simple way to demonstrate the logistic map. It's so simple, "even a baby - nay - fetus could use it" (Tim Cook). To view and download the program, visit *this* link.

0.2 Using the Program

The program consists of just two buttons: all the user needs. Fetch an R value and the computer will do the work for you. It may take some time, but the results are stunning. You can view the time series, cobweb diagram, and bifurcation diagram for whatever R, initial x, and n iterations you select. It's that simple. Click the cog to view settings.

0.3 Interesting Values and What They Mean

The logistic map is often used to model population. R is the growth rate, and f(x), i.e. $R \cdot x \cdot (1 - x)$ models the equilibrium population. For low values of R we see that the species goes extinct regardless of its starting population. However, past $R = 1$ we see actual stability in the population. Once $R > 3$, the bifurcation diagram splits into two. What does that mean? Well, the species goes from one population to the next population then back to the original in a period-2 cycle. Then it bifurcates again. And again. That is until a certain R value, where chaos is seen. Organized chaos. The species is stable, yet, there is absolutely no pattern to the changes in population. The user is encouraged to approximate this R value themselves. Then, at another R value (yet again, try to approximate this) the chaos returns to a period-3 cycle. Then 6, then 12 . . . and it keeps going till chaos again.

0.4 What Are All These Graphs?

The top graph is the bifurcation diagram that demonstrates the *periodicity* of the dynamics of the logistic map. The bottom left graph demonstrates what point the logistic map approaches given a certain starting value (that you can input as initial x). The bottom right graph demonstrates the time series, which represents f(x) as x iterates.

0.5 Further Reading

"This Equation Will Change How You See the World"
"The Feigenbaum Constant"
"Logistic Map"