

CS 346U: Exploring Complexity

Information lab

Writeup due Monday, October 19, 2009

In this lab you will investigate the information content of the “symbolic dynamics” of the logistic map. The symbolic dynamics is calculated as follows: At each time step in the logistic map, whenever x_t is less than 0.5, a “0” is output; otherwise a “1” is output.

Download “information-content.nlogo” from the class web page. Open it in the same directory in which you downloaded Netlogo.

2. For each of $R=2.0, 3.1, 3.49, 3.52, 4.0$ (five different values),

Set x_0 to .2

Repeatedly click “go” , calculating the information content until it has settled to a single (or an oscillating) value.

In your lab report, for each of these values of R , record the symbolic dynamics (the string of 0s and 1s in the output window), the probabilities of 0 and 1, and the final value(s) of information content. Do your own calculation of Shannon information content using these values, showing your work, and see if it agrees with the Netlogo model’s results. Which values of R yields the highest information content, and why? Do you think this information content measure is a good measure of the complexity of the behavior of the logistic map? Why or why not?