

CA3 – Steven Raaijmakers, 10804242

Script usage: when given an arg the script will load the normal GUI. When given no args, the script will startup 1000 CA's (lambda between 0 and 1), and calculate the average Shannon Entropy of each CA (takes a few minutes).

Each lambda CA starts with a random initial state. The figure displays the average Shannon Entropy (SE) for a CA build with a lambda ruleset, created via the table walk through method. The average SE is taken by computing the SE for all timesteps between $t=1$ and $t=\text{height}$ (equals 4 in our case).

The langton parameter is used to define the behavior of automaton, complexity and their classes. A small lambda will give back an automaton with a fixed point or of a periodic kind, which belong to class 1 and class 2 respectively. A bigger lambda will result in a CA belonging to class 3 or class 4.

Since we know that class 1 and class 2 CAs have a low complexity and are produced for a small value of lambda, the SE should be lower than the SE of automaton of class 3 and 4, which are created by taking a bigger lambda. This corresponds to our created figure, which shows an increasing SE while lambda grows. Therefore it seems Langton's theory about the parameter seems correct.