

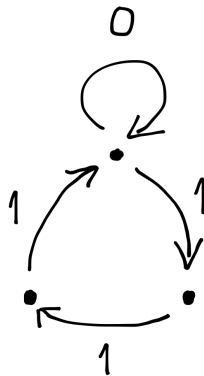
Homework 3

TIF150, Information theory for complex systems

CA information

Consider a one-dimensional cellular automaton given by elementary rule R174, i.e., the neighbourhoods 110, 100, and 000 map to 0, and all others to 1.

Let the initial state ($t = 0$) be characterized by the following finite state automaton (where it is assumed that if two arcs leave the same node they have equal probabilities).



- Is this rule reversible, almost reversible, or irreversible?
- What is the initial entropy density s (at $t = 0$)?
- Derive a finite state automaton describing the CA state after one time step ($t = 1$).
- What is the entropy density s at this time ($t = 1$)?
- What is the entropy density s after two time steps ($t = 2$)?