Machine Ontogeny: Part 2
A Partial Constructor

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Cellular Automata Basics

a type of computational system, actually a dataflow machine, having the following general characteristics

- Elements — unit of division, called “cells”
- Neighborhood — association of units
- States — function of units
- Transitions — conversion between states

Generally, each cell represents a single finite state automaton, and collectively they are called a system of finite state automata (a cellular automata).

Von Neumann Cellular Automata

a specific example

- Elements — square
- Neighborhood — above, below, left, right
- States — 29, represented symbolically
- Transitions — synchronous

A grouping of contiguous cells is known generally as a "configuration," with small units that perform a specific logical function being known as an "organ."

Our partial constructor is a von Neumann cellular automaton – a particular configuration having many organs

Viewing Cellular Automata

Two main means to observe the behavior of a cellular automaton:

Dedicated hardware

- restricted to small spaces
- high rate of transition computation

Emulation software

- very large spaces
- typically quite slow

Available Emulation Software

- Renato Nobili, Physics, University of Padova
  http://www.pd.infn.it/~rnobili/wjvn/index.htm

  very small cell space
  supports only two systems of cellular automata
  slow computation of state transitions

- Tomas Rokicki, et al.

  http://www.sourceforge.net/projects/golly

  unlimited cell space
  supports most known systems of cellular automata
  very high rate of computation of state transitions

A Partial Constructor

- See your email in-box, where you will find an RLE file suitable for loading into Golly, and use Golly to view the configuration of the partial constructor.

Features of a Partial Constructor

- Constitutes a machine zygote
- Includes description of complete configuration
- Complete construction required for self-replication
- Constructs itself, according to included description