Virtual Bumblebees Artificial Life Simulation

James P. Howard, II[1]

1 University of Maryland University College

Summary

In the 1980, Christopher Langton created the virtual ant or sometimes "vant" (Langton 1986). The Langton ant is a cellular automaton such that a cell is occupied by the "ant." If the cell is black, the ant turns 90 degrees to the right and advances a single cell. If the cell is green, the ant turns 90 degrees to the left and advances a single cell. After exiting the cell, the ant flips the color of the cell. This leads to a variety of amazing interactions among multiple ants that effectively replicates eusocial behavior in a number of organisms.

In a popular book on artificial life, Levy describes the virtual ants slightly differently (Levy 1992):

> The vant itself was a V-shaped construct that moved in the direction of its point. If the lead cell moved into a blank square on the imaginary grid, the vant continued moving in that direction. If the square was blue, the vant turned right and changed the color of that cell to yellow. If the square was yellow, the vant turned left and changed the color of the square to blue.

Using Scrivner's implementation of the Langton Ant as a base (Scrivener 2012), this software package implements the construction described by Levy in Javascript. This can be used to model eusocial behavior, network traffic, and other nonlinear problems.

References

Langton, Christopher G. 1986. "Studying Artificial Life with Cellular Automata." *Physica D: Nonlinear Phenomena* 22 (1-3). Elsevier: 120–49.

Levy, Steven. 1992. *Artificial Life: The Quest for a New Creation*. New York: Pantheon.

Scrivener, Ross. 2012. "Langton's Ants - in Javascript." http://rossscrivener.co.uk/blog/langtons-ants-in-javascript.