CS 790R Seminar
Modeling & Simulation

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HOMEWORK ASSIGNMENT 2:
FLUID NEURAL NETWORK MODEL OF ANT COLONY

Write a NetLogo program that implements the Fluid Neural Network model described in the references [1,2,3] in the simplest and most efficient way you can. The interface must contain adequate setting components for the relevant parameters of the model and display the activity-vs.-time plot (see Fig. 6.7 of [1]), updated in real time. Write a minimal documentation in the "Information" tab that follows the template sections and includes your name in "Credits and References".

In a second step, exploit your program to attempt reproducing the phase transition boundary between order and chaos in an appropriate region of parameter space, based on one of the order quantities discussed in the papers (see for example Fig. 6.8 of [1] and Fig. 3, 5 of [3]). Only one boundary line between two domains is requested. Generate the necessary data automatically and use the graphing tool of your choice (NetLogo or other) to plot the values.

All other implementation decisions are left to your understanding of the model, good judgment and creativity. No questions will be answered. Please work individually.

Deliverables to e-mail to the instructor before **Tuesday, March 15, 2005 at 4pm**:

- **`FluidAnts_<`*`lastname`*`>.nlogo`**: complete NetLogo file
- **`FluidAnts_<`*`lastname`*`>.txt`**: text file containing the phase transition plot values
- **`FluidAnts_<`*`lastname`*`>.jpg`**: high-resolution image of the phase transition plot

BIBLIOGRAPHY

1. Solé, R. & Goodwin, B. (2000) *Signs of Life: How Complexity Pervades Biology*, pp157-164. Perseus Books.

2. Solé, R., Miramontes, O. & Goodwin, B. C. (1993) Oscillations and chaos in ant societies. *Journal of Theoretical Biology*, **161**(3): 343-357.

3. Solé, R. & Miramontes, O. (1995) Information at the edge of chaos in fluid neural networks. *Physica D*, **80**: 171-180.