

**CS 410/510**  
**Nonstandard Computation**  
**Spring, 2008**

**Problem Set 2: Cellular automata**

Due Tuesday April 29.

(1) Write code (in any high-level language) to simulate one-dimensional, binary state elementary (nearest neighbor) cellular automata, where lattice length and CA rule (expressed as an integer between 0 and 255) are input parameters. Also write code that can produce space-time diagrams for your cellular automata.

(2) For elementary CA rules 15, 30, and 110, write code that can calculate the three local information measures of Lizier et al., discussed in class. These are: local information storage, local information transfer, and local separable information. Let  $k$  equal 8 in all cases.

Write code that can produce diagrams that display the values of these measures in each cell (one diagram per measure).

We will discuss how to do all this in detail in class. If you miss the discussion, either see me or talk to another student for details.

**What to hand in:**

**Electronic:** A file with your code for tasks (1) and (2), commented, along with instructions on how to run your code. (Do not turn in hard copies of code.)

**Hard Copy:** For each CA (15, 30, and 110), a space-time diagram started from a random initial configuration, along with three diagrams showing the value of the three local information measures at each site (one diagram per measure). Use lattice length 200. Answer the following: Do the three local information measures seem to provide information about the Wolfram class of the CA rule? Explain.