Final Lab Beamer

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Image Kernels

By convolving images in conjunction with one of the following kernels, the resulting image's features are accentuated, as a's matrix derives the vertical features, especially from the top, and b's features derive the left side features, as well as horizontal features.

$$a = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

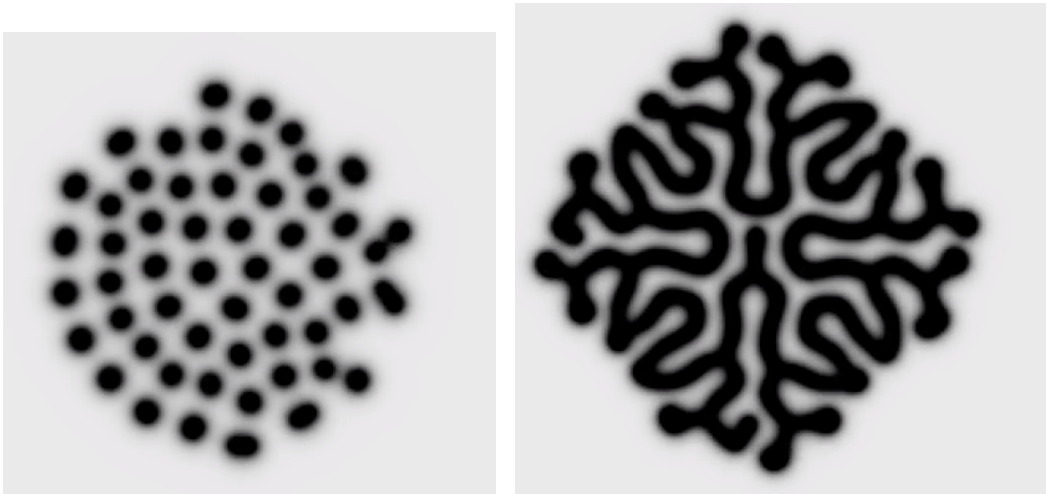
$$b = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

Automata & Simulations

The following processes were modeled in this lab: The Game of Life, Surface Tension model, Forest Fire model, Nonlinear Waves, Wireworld Wire and Oscillator, Fitzhugh-Nagumo Reaction Diffusion and Gray Scott Reaction Diffusion. The first 6 were pixel models with rules defining progression of the model, while the latter 2 modeled PDE's with unique complex graphical models.

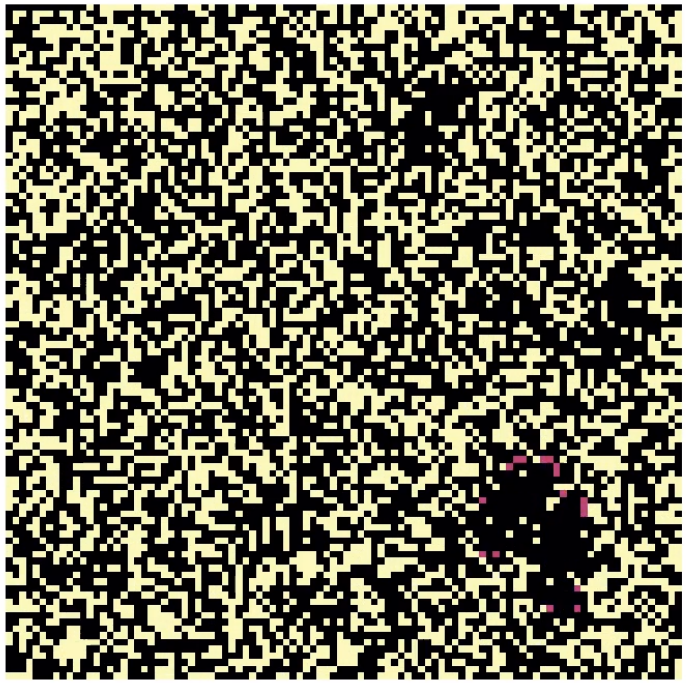
Gray Scott Reaction Diffusion

A prime example of the Gray Scott Reaction Diffusion, the bacteria setup naturally represents a dividing bacteria, a phenomenon so unrelated to the mundanity of mathematics, yet so perfectly represented by this setup.



The worm 2 function is equally interesting, a more complex progression of previous examples such as the game of life, since it develops its own intricacies while maintaining its basic general structure.

Forest Fire Model



The randomness of the forest fire directly relates to the presence of forest area, which is the primary condition for a lightning strike to start a fire, this basic condition provides for such an intriguing interaction that results in beautiful images.