Excercise 1.
Implementing a first Application in RePast: A Rabbits Grass Simulation.

Group №87: El Abridi, Kalim

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1 Implementation

1.1 Assumptions

- The Grid is a torus
- Rabbits die when they reach 0 in energy
- A grass cell may contain multiple "grasses"
- Rabbits can only move in one direction at a time
- No two rabbits can stay on the same cell
- Rabbits and Grass are created at random places

1.2 Implementation Remarks

- Rabbits are blue, Grass is shades of green and the background is black
- Rabbits don't have a lifespan
- Rabbits start with X energy

2 Results

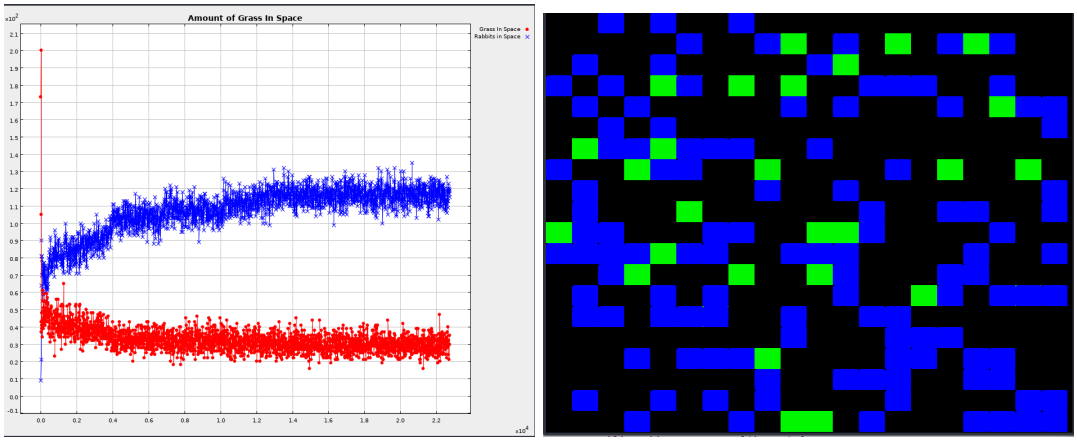
2.1 Experiment 1

2.1.1 Setting

- Birth Threshold = 10
- Initial number of rabbits = 10
- Initial number of grass = 100
- Grass growth rate = 10

2.1.2 Observations

It seems that this particular configuration leads to an equilibrium of about 120 rabbits and 30 grass cells. Most "reasonable" configurations seem to give a similar output.



(a) Evolution graph (b) Simulated grid

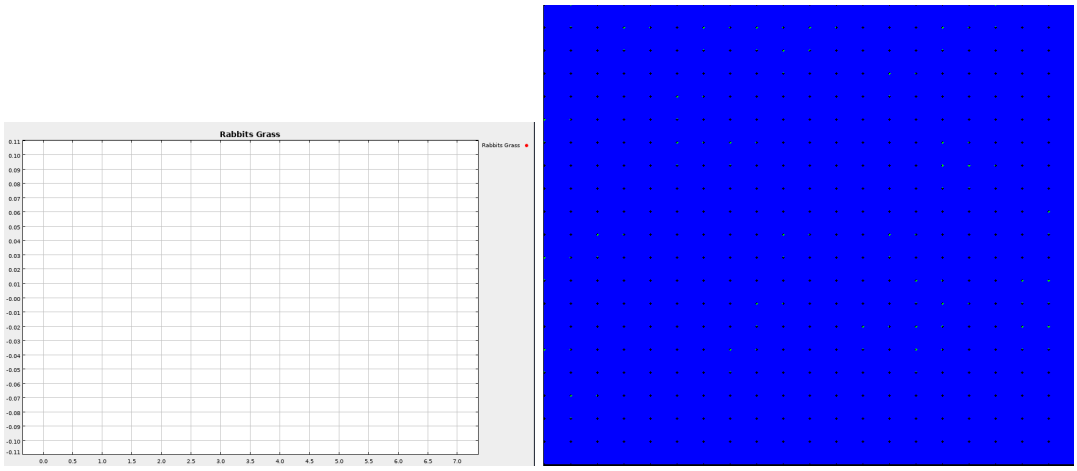
Figure 1: Evolution graph and grid

2.2 Experiment 2

2.2.1 Setting

- Birth Threshold = 1
- Initial number of rabbits = 10
- Initial number of grass = 100
- Grass growth rate = 10

2.2.2 Observations



(a) Evolution graph (b) Simulated grid

Figure 2: Evolution graph and grid

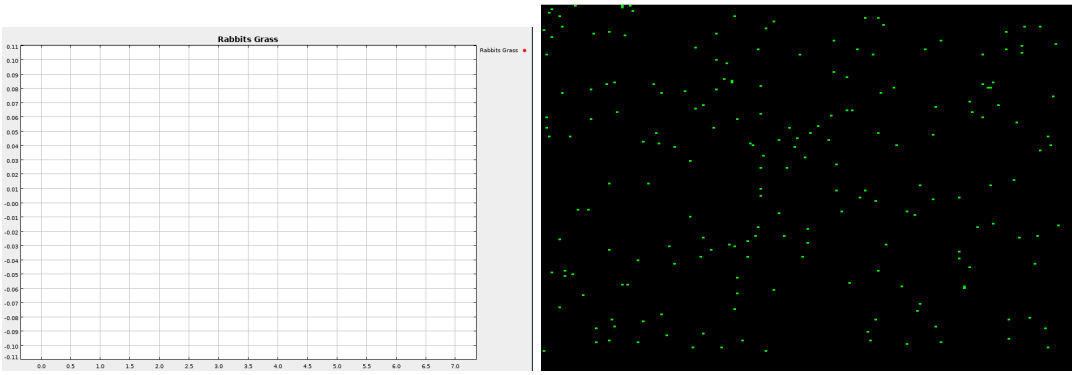
In this configuration, the number of rabbits instantly explodes and fill the whole space. There is no more room for any new grass or rabbit, so the simulation shuts down.

2.3 Experiment 3

2.3.1 Setting

- Birth Threshold = 1
- Initial number of rabbits = 10
- Initial number of grass = 100
- Grass growth rate = 10
- Grid size = 200x200

2.3.2 Observations



(a) Evolution graph (b) Simulated grid

Figure 3: Evolution graph and grid

In this configuration, the space is way too big for the rabbits. They use all their initial energy level (5) before reaching any grass. They all die.