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

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1 Implementation

1.1 Assumptions

- 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 (they die when they reach 0 energy)
- Rabbits start with 5 energy
- The Grid is a torus, when reaching the edge the rabbits come from the other side

2 Results

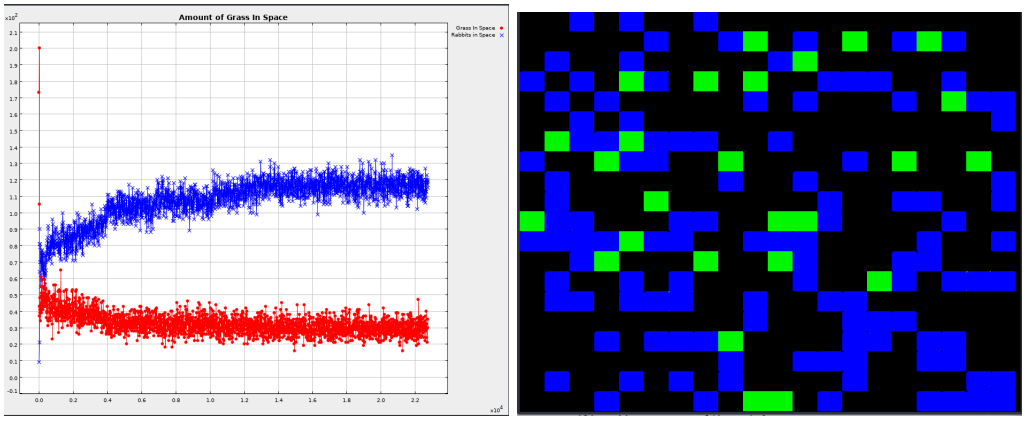
2.1 Experiment 1

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

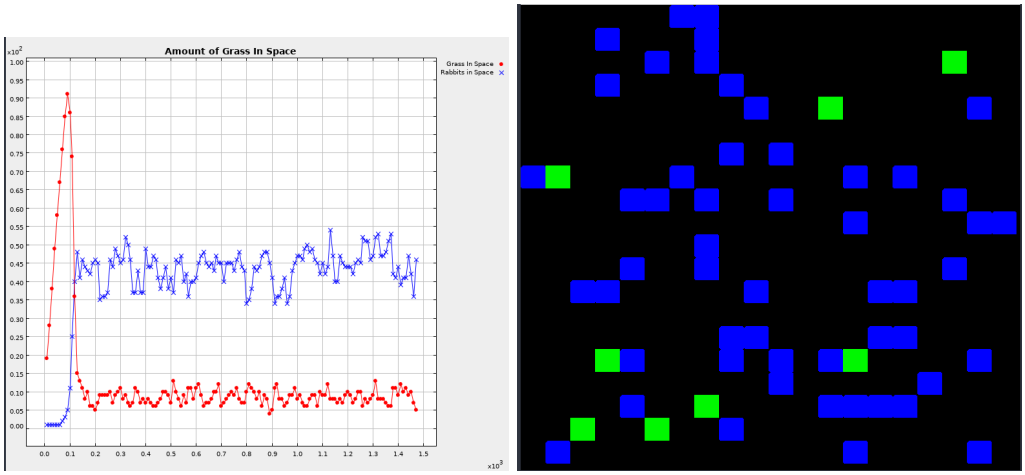
Figure 1: Evolution graph and grid for experiment 1

2.2 Experiment 2

2.2.1 Setting

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

2.2.2 Observations



(a) Evolution graph (b) Simulated grid

Figure 2: Evolution graph and grid for experiment 2

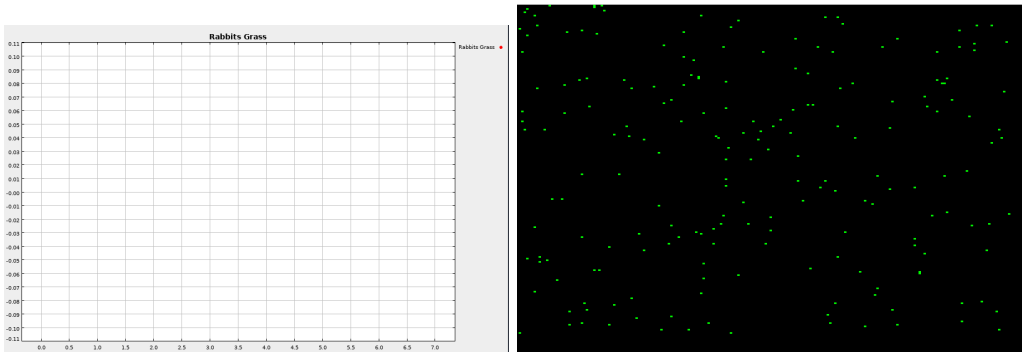
In this configuration, even though the grass is sparse due to the low grass growth rate, the rabbits manage to sustain an maintain a stable population around 40 rabbits. The rabbits even out-number the grass cells !

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 for experiment 3

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. The evolution graph is empty due to the simulation stopping before the 10th iteration (the graph updates every 10 ticks).