

MAX-PLANCK-INSTITUT
FÜR DEMOGRAFISCHE
FORSCHUNG

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FOR DEMOGRAPHIC
RESEARCH





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Game of Life

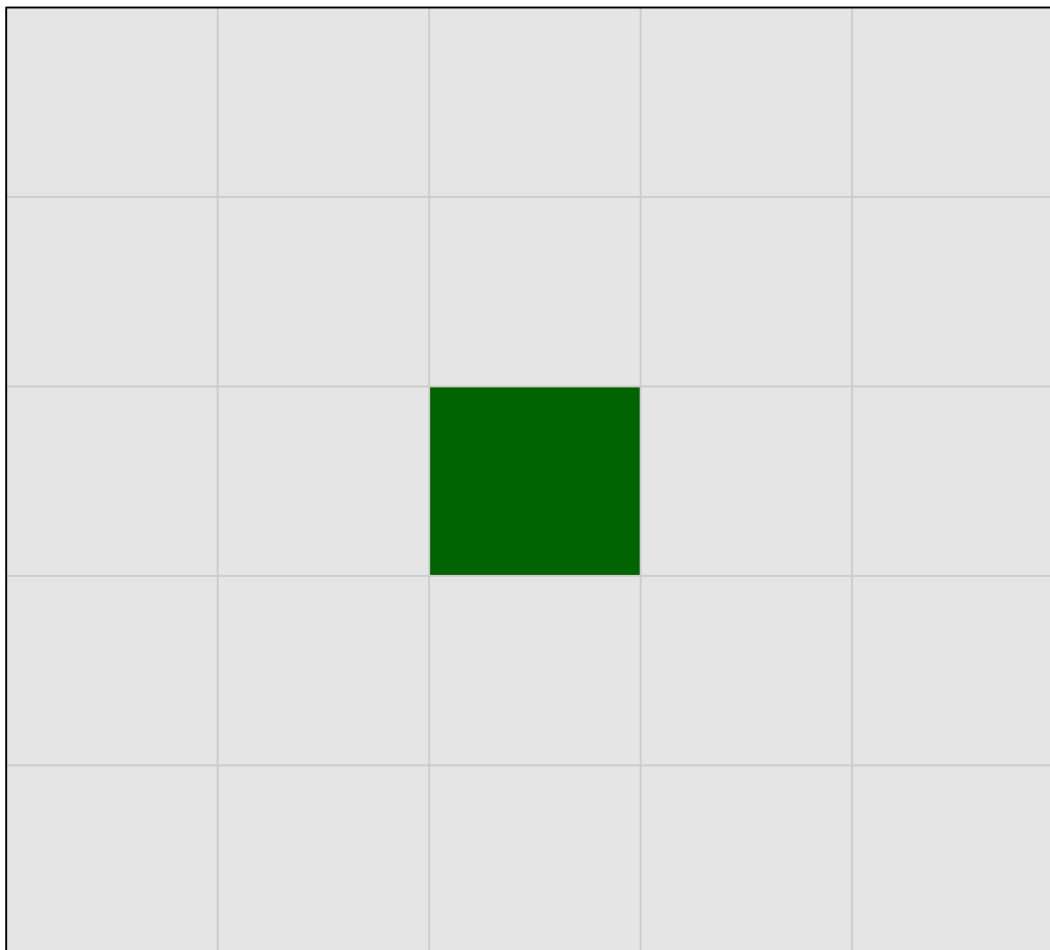


Game of life (slightly simplified)

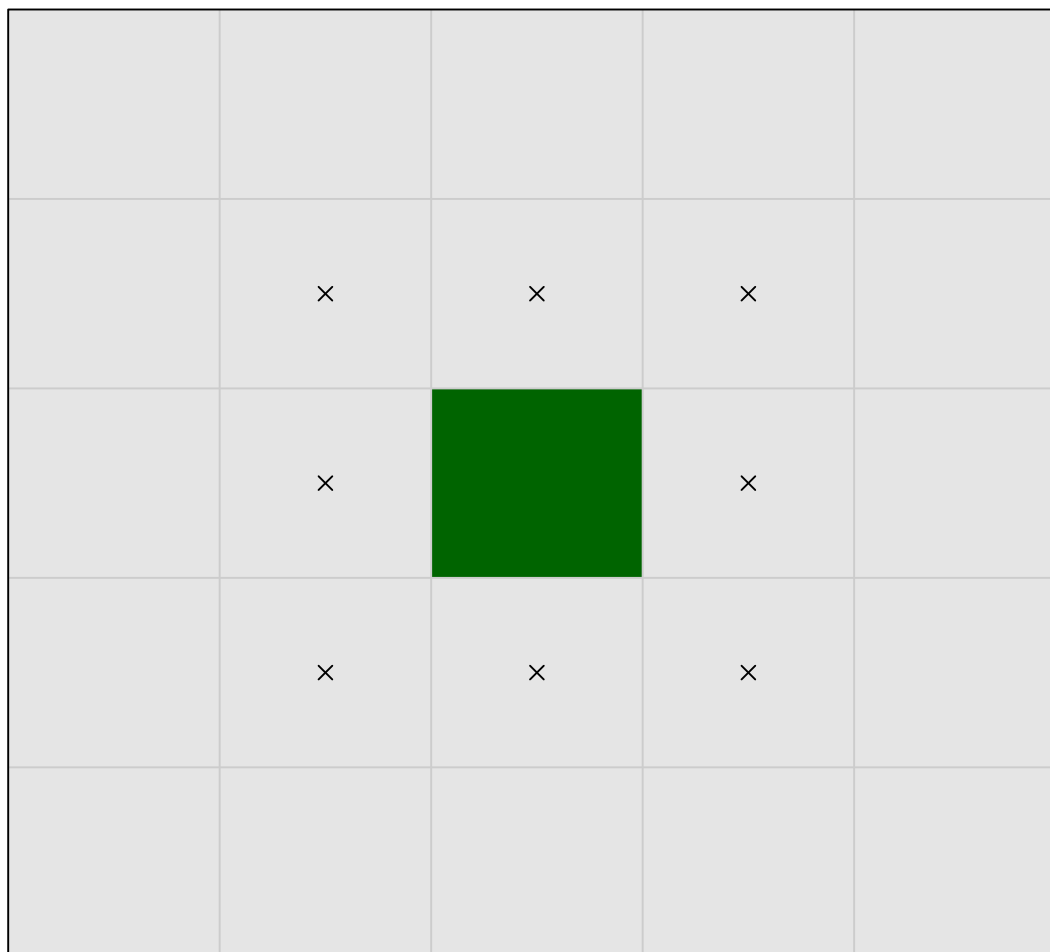
- Devise by John Conway
- Cells are arranged on a rectangular grid
- Each cell can have one of two states:
 1. Alive
 2. Dead
- Cells change their state according to their neighborhood:
 1. Any living cell with less than two living neighbors dies (underpopulation)
 2. Any living cell with two or three living neighbors lives on
 3. Any living cell with more than three living neighbors dies (overpopulation)
 4. Any dead cell with exactly three living neighbors becomes a living cell (preproduction)
 5. Any dead cell with less or more than three living neighbors stays dead

Empty grid

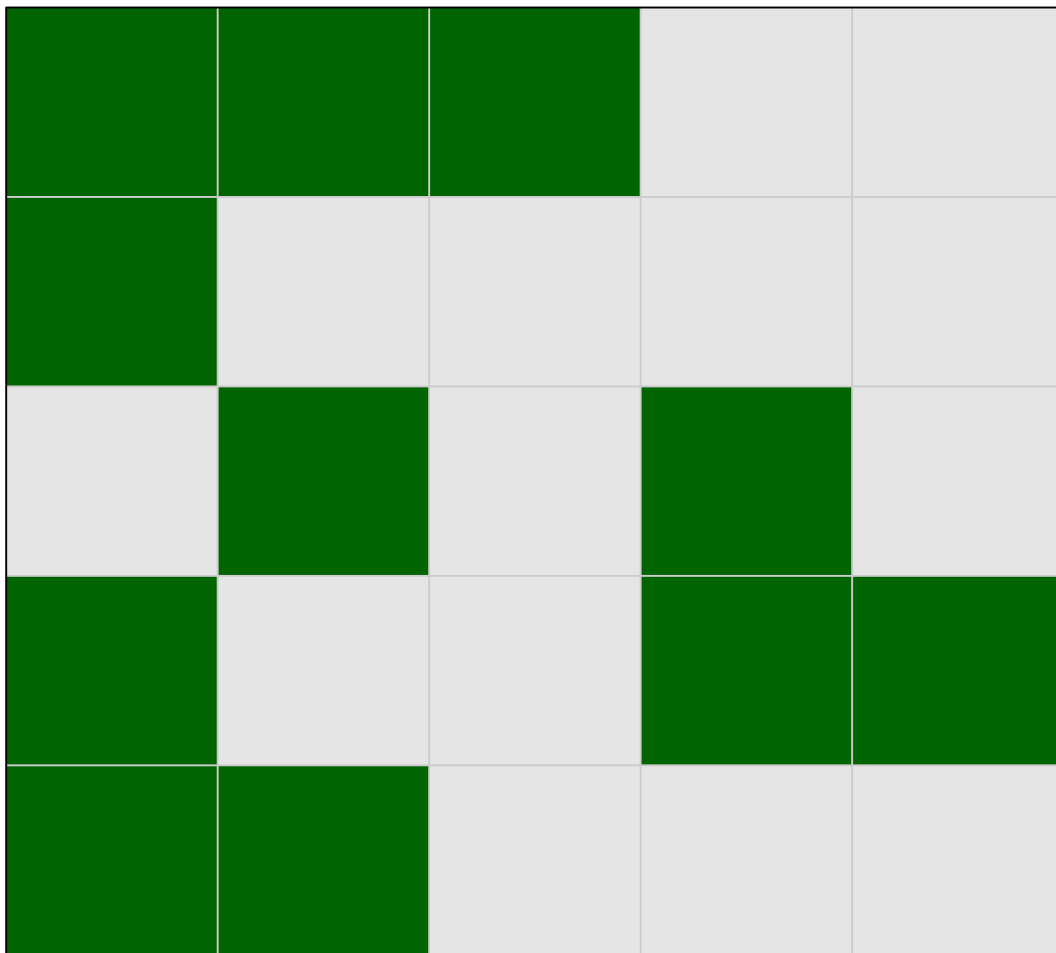
Grid with living and dead cells



Neighborhood



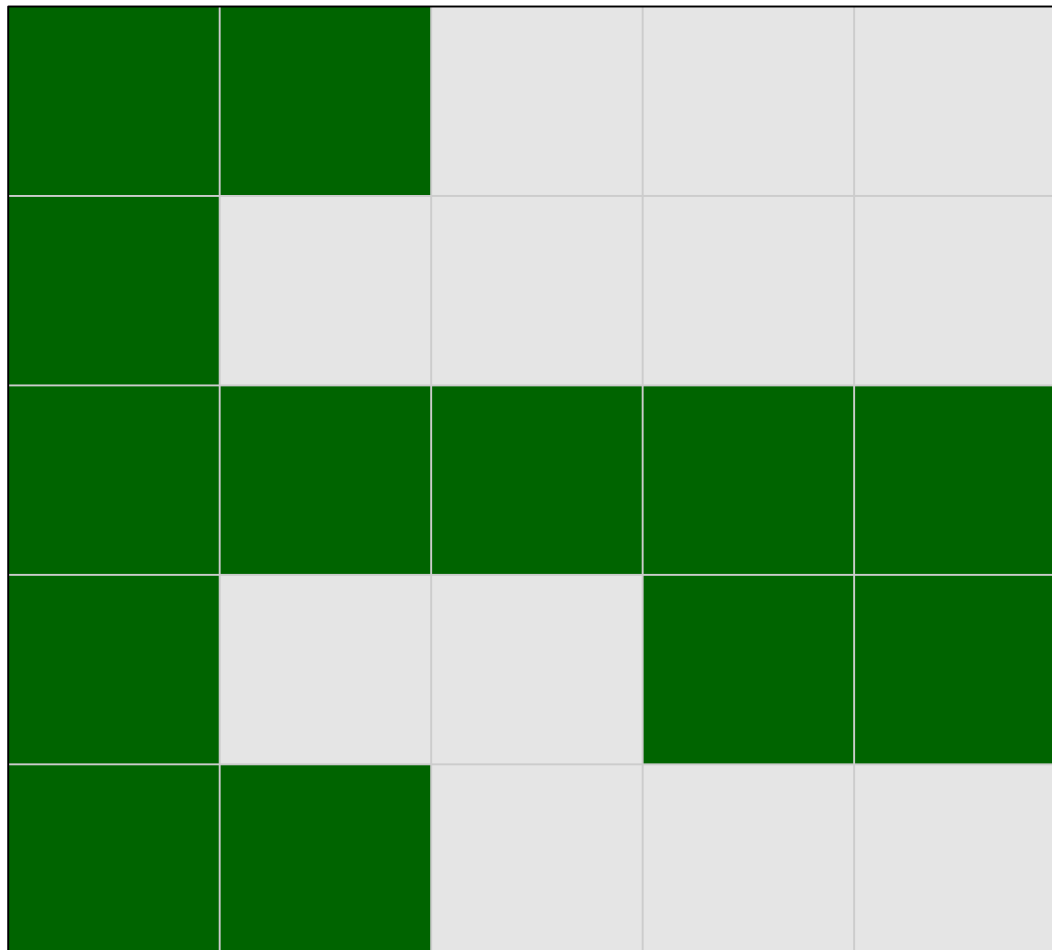
Example



Number of neighbors

2	3	1	1	0
3	5	4	2	1
3	2	3	2	3
3	4	4	2	2
2	2	2	2	2

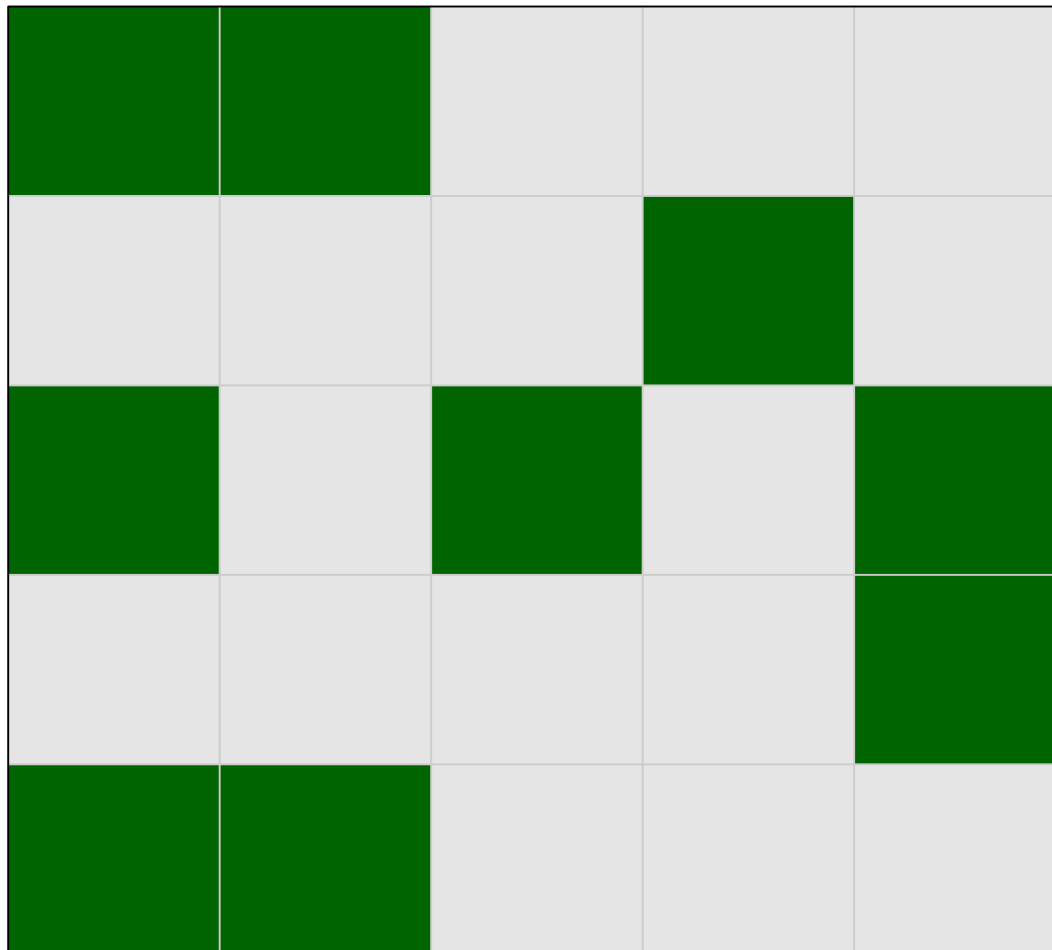
Applying the rules



Number of neighbors

2	2	1	0	0
4	6	4	3	2
3	4	3	4	3
4	6	5	4	3
2	2	2	2	2

Applying the rules





How to do this in R?

- Set up a grid with dead and living cells
- Assess neighborhood
- Change states
- Visualization
- (Do all of that repeatedly)



Game of life: Extensions

- Propagation/diffusion of information
- Probabilistic rules
- More systematic assessment of model output