



# Artificial Life:

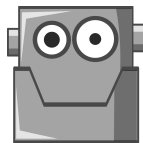
## A Very Quick Introduction

Sergiu Ivanov

[sergiu.ivanov@univ-evry.fr](mailto:sergiu.ivanov@univ-evry.fr)

<http://lacl.fr/~sivanov/doku.php?id=en:alife-intro>

What is artificial life?



<https://openclipart.org/>

# Artificial Life: A (Partial) Replica of Real Life

**Artificial life** = a field of study which consists in examining **systems related to natural life** through the use of simulations.

- ▶ computer models, robotics, biochemistry, etc.

---

The term was coined in 1986 by **Christopher Langton**, an American biologist.



[https://en.wikipedia.org/wiki/Artificial\\_life](https://en.wikipedia.org/wiki/Artificial_life)

# Synthetic Life: Life In Vitro

**Synthetic life** = artificial life created in vitro from biomolecules and their component materials.

Why?

- ▶ study the **origins** of life
- ▶ study the **properties** of life
- ▶ **recreate** life

[https://en.wikipedia.org/wiki/Synthetic\\_life](https://en.wikipedia.org/wiki/Synthetic_life)

Which among these are artificial life?



a laptop



a neural network



a robotic arm

# Types of Artificial Life

## Software-based

- ▶ cellular automata
- ▶ neural networks

## Hardware-based

- ▶ robots

## Biochemical

- ▶ synthetic biology

# Types of Artificial Life

## Software-based

- ▶ cellular automata ← we will focus on this one
- ▶ neural networks

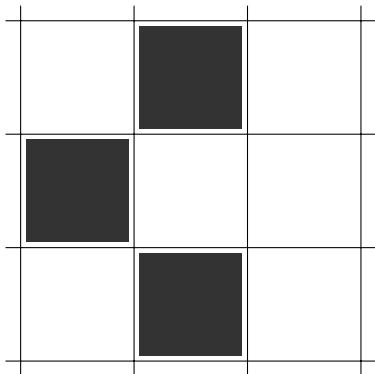
## Hardware-based

- ▶ robots

## Biochemical

- ▶ synthetic biology

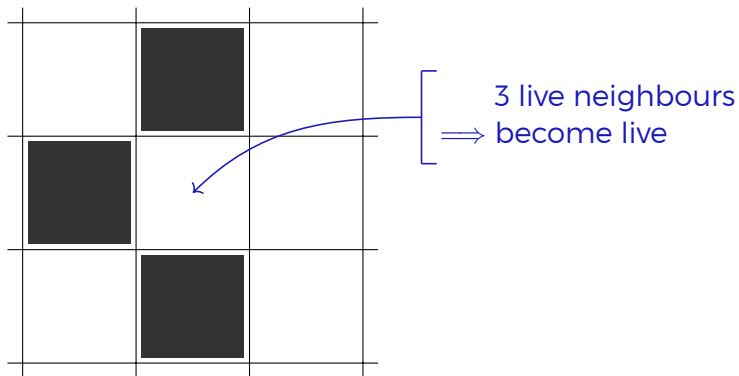
# Cellular Automata



- ▶ infinite grid

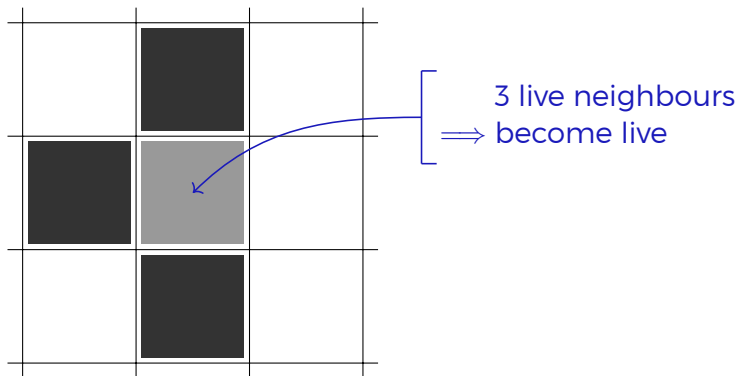


# Cellular Automata



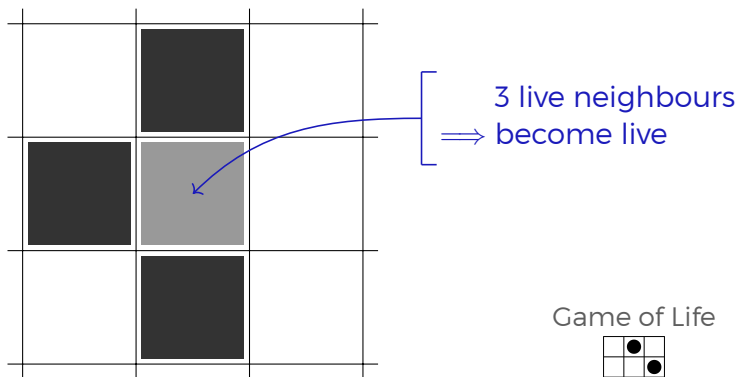
- ▶ infinite grid
- ▶ simple local programs in cells

# Cellular Automata



- ▶ infinite grid
- ▶ simple **local programs** in cells
- ▶ step-by-step global updates

# Cellular Automata



Game of Life



- ▶ infinite grid
- ▶ simple **local programs** in cells
- ▶ step-by-step global updates

# NetLogo

We will use **NetLogo** to implement some **artificial life**.

<http://ccl.northwestern.edu/netlogo/>



It even runs in the Web browser:

<http://www.netlogoweb.org/launch>

(A download seems recommendable.)