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## **Algoritmos e Estruturas de Dados**

### **Disciplina 301477**

Programa de Pós-graduação em  
Computação Aplicada

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# **Pratica de Laboratório 05**

## **Matrizes**

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## 1. Matrizes

Problema 1: *The Game of Life*, invented by John Conway in 1970, is an example of a zero-player “game” known as a cellular automaton. The game consists of a two-dimensional world extending infinitely in all directions, divided into “cells.” Each cell is either “dead” or “alive” at a given “generation.” The game consists of a set of rules that describe how the cells evolve from generation to generation. These rules calculate the state of a cell in the next generation as a function of the states of its neighboring cells in the current generation. In a 2-D world, a cell’s neighbors are those 8 cells vertically, horizontally, or diagonally adjacent to that cell. At each step in time, the following transitions occur:

## 1. Matrizes

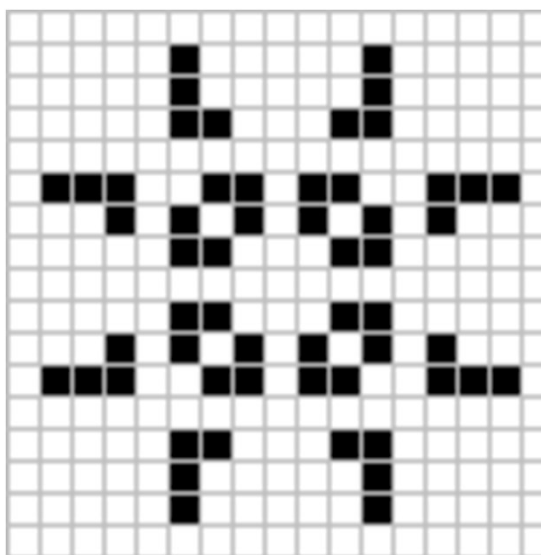
- I. Any live cell with fewer than two live neighbors dies, as if caused by under-population.
- II. Any live cell with two or three live neighbors lives on the next generation.
- III. Any live cell with more than three live neighbors dies, as if by overcrowding.
- IV. Any dead cell with exactly three live neighbors becomes a live cell, as if by reproduction.

In this lab, we will implement Conway's Game of Life, with the minor restriction that our 2-D world is finite. The neighbors of a cell on the edge of the world that would be beyond the edge are assumed dead. You can read more about Conway's Game of Life on Wikipedia at [http://en.wikipedia.org/wiki/Conway%27s\\_Game\\_of\\_Life](http://en.wikipedia.org/wiki/Conway%27s_Game_of_Life).

Este problema foi adaptado do curso 6.087: *Practical Programming in C* promovido pelo Massachusetts Institute of Technology (MIT), Department of Electrical Engineering and Computer Science.

## 1. Matrizes

Declare uma matriz, definida conforme a ilustração abaixo, que representa a geração inicial do autômato.



Escreva um programa que implementa o jogo da vida e mostra o estado de cada geração utilizando as funções da PlayCB (<http://playapc.zaghetto.com/>).