

## Introdução à Inteligência Artificial

Licenciatura em Engenharia Informática, Engenharia Informática – Pós Laboral e  
Engenharia Informática – Curso Europeu

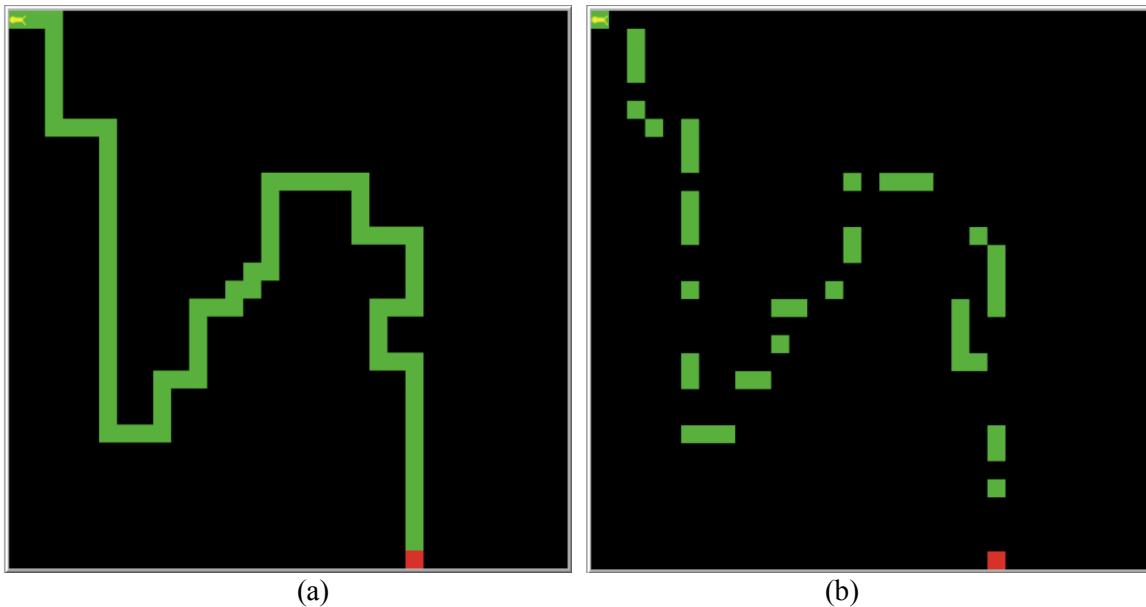
2º Ano – 1º semestre

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Aulas Laboratoriais

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### Class 4 - The Santa Fe Trail



**Figure 1** – (a) Complete path to be followed by the agent; (b) Example of a trail with several gaps.

The goal of this assignment is to find a rational behavior for an agent that allows it to identify and follow a food trail (figure 1a) in a two dimensional environment. The trail might have several gaps (figure 1b), thereby increasing the difficulty of the task. In the toroidal environment, green cells signal the path. The agent is placed in the beginning of the trail and must follow it until the end.

There are two main goals for this task:

- Reach the red cell that marks the end of the trail, after collecting the highest possible number of food packets;
- Minimize the number of perceived cells.

The basic agent has the following features:

- **Perceptions:** It can only perceive the cell immediately ahead;
- **Actions:** It can move forward, turn left 90° or turn right 90°;
- It is aware of its heading direction;
- It is a simple reflex agents (it does not have memory);
- Whenever the agent hits a green cell, it collects the green food and the cell becomes black.

## **Trails**

Two trails are available to the experiments. By modifying the value of the gaps variable, trail of different difficulty can be created. Higher gaps values correspond to harder problems.

## **Basic Implementation**

The basic implementation of the model is available on Moodle. Download the netlogo and the TXT files for your computer.

The basic implementation creates the environment with selected trail and defined gap probability. It also considers an extremely simple behavior: if the trail is directly accessible from the current cell, the agent follows the path. Otherwise, it stops.

## **Tasks to Perform**

1. Change the move-turtle function, to enhance the behavior of the agent when it finds gaps in the trail. Compare different implementations e verify which one corresponds to a more efficient behavior (e.g., more food collected in less iterations). Analyze the impact of the gap variable in the results;
2. Consider that agent can have one integer variable as memory. Change its behavior taking this modification into consideration and repeat experiments;
3. Perform a comparative analysis of the results obtained in the previous points. Verify if the addition of memory confers the agent with any advantage in defining rational behaviors for this problem.