

Artificial Intelligence: Term project

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1 Overview

The goal of this project is to demonstrate mastery of AI techniques explored throughout the course. You will develop a software simulation of a 2-agent system, where agents are competing with each other (i.e., in a game scenario). The AI should be the same for both agents; the goal is to show how they reason and interact with each other.

1.1 Tools and technologies

You may use any programming language you like. Ideally, the project will be demonstrated in the Webots simulator, which allows you to create 3D worlds with robots controlled by you; but, this is not strictly necessary (you may just demonstrate a command-line game). The primary objective is to exercise problem solving through search, game trees, minimax, etc.

1.2 Requirements and objectives

You may implement any 2-player game you like. If you do not know which game to implement, I suggest 2-player Pacman. Minimum requirements:

- 8x8 board
- Players begin in opposite corners
- Each cell is either empty, or contains a coin (initialized at random)
- When a player enters a cell with a coin, it consumes it, and its score is increased by 1
- Game ends when there are no more coins
- Players take turns to move. Each player can move one cell up, down, left, or right. Players cannot simultaneously occupy the same cell.
- Each players has full observability of the board: they know where the opposite player and all the coins are.

Optional requirements:

- Each coin has a 50% chance of becoming "transparent": when transparent, it is not consumed. When transparent, it has a 50% chance of becoming solid again.
- Players get a bonus for number of successive coins consumed in a row. E.g., if a player consumes 3 coins in 3 consecutive moves, their score for those 3 coins is squared (9, instead of 3).

Notice: minimum requirements can be solved optimally with just game tree search and minimax. Optional requirements require probabilistic minimax (coin behavior is non-deterministic) and potentially stochastic search methods (e.g., GAs) to find the best successive group of coins.

1.3 Deliverables

You must submit, through MCV, all the code required to execute your project (if using Webots, code + Webots project files), plus a short document explaining how to build and execute your code.

In class (Friday, April 26th) we'll do a short presentation (5 minutes each) demonstrating your solution and explaining the Artificial Intelligence that you implemented.