Lecture Review Sheet: Artificial Intelligence
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CMPUT 299
Winter 2006

Terms and Definitions

Intelligence is usually said to involve mental capabilities such as the ability to reason, plan, solve problems, think abstractly, comprehend ideas and language, and learn.

Artificial Intelligence: Intelligence exhibited by an artificial entity. *or* The process or means by which agents make rational actions in an environment.

Algorithm: A detailed set of actions which can be performed in accomplish a given task.

Main Ideas and Concepts

How can we evaluate an algorithm?

1. Does it meet our time constraints?
2. Does it meet our memory constraints?
3. Does it solve the task at hand?
4. Does it do so in an acceptable/realistic manner?

What makes up an algorithm?

- The available actions in the world.
- The [relevant] state of the world. (eg. The location of objects and NPCs.)
- The transitions in the world. (How applying actions changes the state of the world.)

Finite State Machines (FSM)

- One possible way to represent an algorithm.
- There are two ways to diagram a FSM:
    - Draw possible actions in boxes, use states decide when to transition between boxes
    - Draw possible states in boxes, use result of actions to decide when to transition between boxes
- Examples for FPS game in PPT slides
- Exercise: Draw a FSM for a simple traffic signal. Try both of the above methods.

Pathfinding

- Needed in a broad spectrum of games.
- Can use simple FSM's

    - Fast
    - May work for many cases, but will fail or perform poorly in complicated environments
- Breadth-First Search (BFS)
    - Label all moves with costs in order to find best possible paths
    - Too expensive in practice
- A*
    - Combine cost calculations from BFS with cost estimates to run faster
    - See example in PPT notes
    - Usually faster than BFS, but slower than a FSM
- Many other issues in pathfinding
    - What happens when there are many different agents in the world?
    - How do you handle collisions?

Other points and notes:

- There is a gap between the academic work on AI and game-industry work on AI. The game industry only cares about the illusion of intelligence.
- These are mostly low-level Artificial Intelligence issues. High level issues will be discussed in later lectures as time permits