INTRODUCTION TO AI
STRIPS PLANNING
.. and Applications to Video-games!
Project ideas

- Smart pre-processing
- PDDL–Golog synergy
- FSM–BTs synergy
- Replanning in Unity3D
- STRIPS extensions in Unity3D
- STRIPS in Valve’s GE
Project ideas: Smart pre-processing
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- Academic planners rely on serious pre-processing
- FastDownward compiles the problem into a SAS format (*)
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- Academic planners rely on serious pre-processing
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- Maintain such a structure for many NPCs and update the information instead of re-compute every time
Project ideas: PDDL–Golog synergy
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- Simple Golog implementation in Prolog

- Simple PDDL parsing and planning in Prolog
  - Provided in the files of Lecture 3

- Adapt the Golog implementation to take as input a PDDL domain/problem instance and solve wrt a Golog program instead of the goal
Project ideas: PDDL–Golog synergy

- Develop a visual language (and GUI) for specifying Golog programs based on BTs!

Flowchart:
- Until fail
  - Enemy in sight
- Until fail
  - Invert
  - Enemy in sight
- Find a way to attack (using planning)
- Look around
Project ideas: FSM–BTs synergy
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- Behavior Trees
- Goal Oriented Action Planning

- A combination of these techniques?
  - BTs for reactive decision making
  - GOAP for tactical decision making
Project ideas: FSM–BTs synergy

- “Behave” tool for Unity3D by Angry Ant
  - [http://eej.dk/angryant/behave/](http://eej.dk/angryant/behave/)
  - Visual interface for building BTs
  - Generates code to be used in Unity3D

- “iThink” tool for Unity3D by [Anastassiou, Diamantopoulos, Vassos, Koubarakis 2012]
  - [https://code.google.com/p/ithink-unity3d/](https://code.google.com/p/ithink-unity3d/)
Project ideas: FSM–BTs synergy

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Project ideas: Replanning in Unity3D
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- Use iThink-Unity3d as the basis
- Extend it with a sensory system that updates the current state according to changes in the game-world
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- Extend it with a sensory system that updates the current state according to changes in the game-world

- Implement some simple policies for execution monitoring and replanning
  - Check the next n actions in the plan and verify that they can be executed
  - Extend the planning system to include conditions at each step that need to be true for continuing the execution
Project ideas: STRIPS ext. in Unity3D
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- Adopt an open world assumption
- Adopt functionality similar to PKS
- Introduce features that are important for a particular game genre, e.g., durative actions
- ...

Project ideas: STRIPS in Valve’s GE
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- Similar to iThink-Unity3d but now in a real game!
- C++
- Adventurous as there is only some basic documentation (but also an active forum)
- It’s the best only way to convince people in the game industry that your technique works
Valve’s game engine already uses the terminology used in academic planning
- Condition $\rightarrow$ literal
- Task $\rightarrow$ action
- Schedule $\rightarrow$ plan

The thinking function of NPCs uses a nice execution monitoring mechanism that decides which plan to follow and when to stop executing a plan

But instead for searching for plans, a small set of pre-defined schedules are used
Project ideas: STRIPS in Valve’s GE

- [https://developer.valvesoftware.com/wiki/Shared_conditions](https://developer.valvesoftware.com/wiki/Shared_conditions)
Project ideas: AI competition