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NI controller

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Overview

- Evolutionary Algorithm
- Sliding Window
- Pessimistic Iteration
- Adaptive Pathlength
- Heuristic and Reward
- Heuristic Switch
- Gamedetection

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Evolutionary Algorithm

- Initial pool with a list of just random actions → path
- Crossover: For 50% action of the first and for 50% the action of the second
- Mutation: Crossover with a random path
- Example:

```
--> [score:6.0 , portal:0.5897445701565585, npc:0.8717954414118179, length:5] ACTION_USE,ACTION_UP
[score:6.0 , portal:0.589744262302434, npc:0.8461544870307561, length:5] ACTION_RIGHT,ACTION_USE,A
[score:6.0 , portal:0.5897444385748493, npc:0.8717950862006526, length:5] ACTION_RIGHT,ACTION_RIGH
[score:4.0 , portal:0.5384615976997722, npc:0.8461545467433345, length:5] ACTION_DOWN,ACTION_UP,AC
[score:4.0 , portal:0.5641025990757296, npc:0.8717950119977794, length:5] ACTION_DOWN,ACTION_UP,AC
[score:0.0 , portal:0.5384619104396772, npc:0.846153904799866, length:5] ACTION_DOWN,ACTION_RIGHT,
```

Sliding Window

- Do not throw away the population from the last game tick.
- Delete the first action and add one to the end.
- Reset the generation counter and remove the score of all pathes.

Pessimistic Iteration

- Check always the next action n times
- If the agent dies → search for another path by selecting the next best of the pool with another first action → do it again until the agent stays alive or the time is over

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Adaptive Pathlength

- Problem: Advance method has no static time duration
- An Evolutionary Algorithm makes no sense if we stay always in the first generation
- Adapt the path length of each entry of the pool to complete always the fourth generation → this is combined with the sliding window approach.

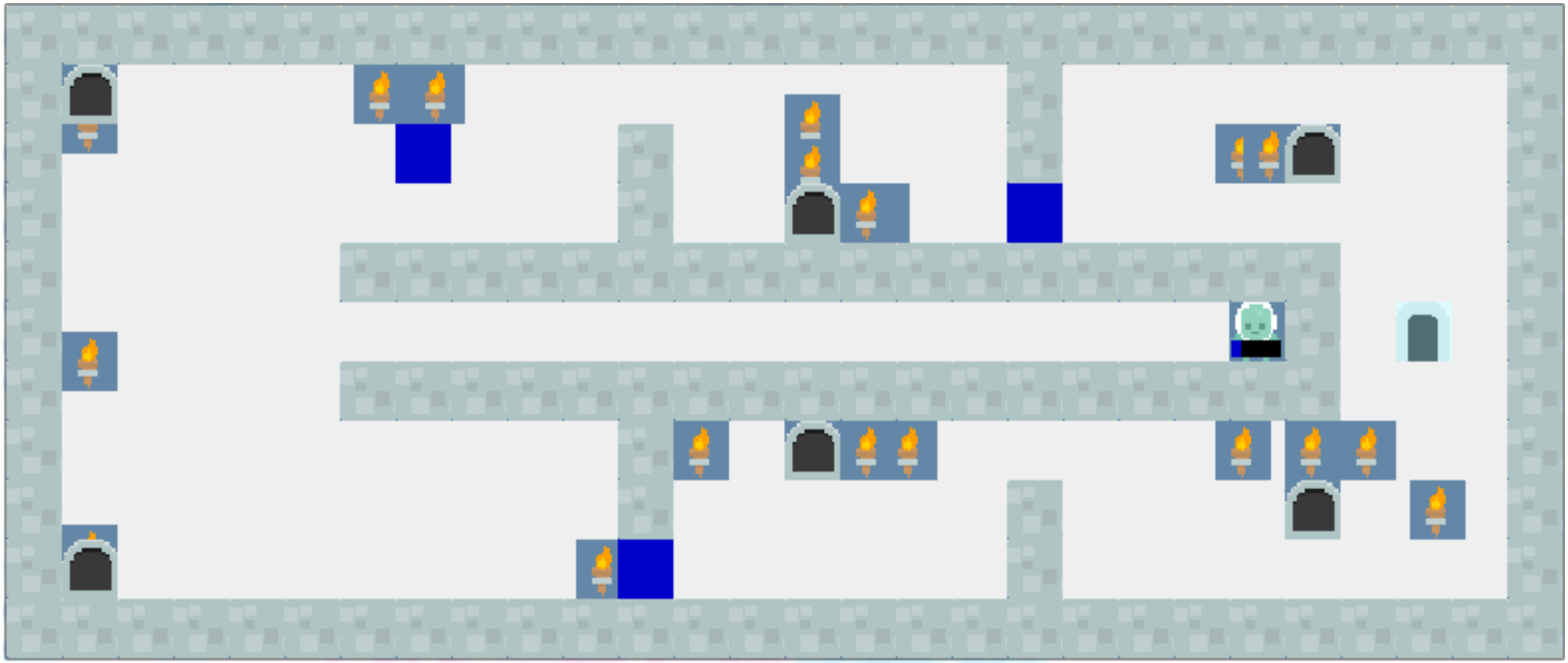
Heuristic and Reward

- Different ways to evaluate a path:
  - 1. Reward
    - Depends on gamescore and win/lose
  - 2. Heurstic Value
    - Is generated for every state in the path
    - Different Targets:
      - NPC
      - 2x Portal
      - ect...
- Compare two paths:
  - When Reward == 0 → use the heuristic value

Heuristic Switch

- Sometimes one game needs different heuristics

- approaches:
  - switch heuristic after a defined number of timesteps
  - switch heuristic randomly



Gamedetection

- Detect the game which is played:
  - generate String of Objects in the game (npc, portal,...) → store hash value
  - Constructor: put known hash values in hash set
  - at the beginning of every game → check which game is played
  - set settings depending on the game (pathlength, heuristic, ...)
- Improved performance in the 20 known games
- Did not decrease performance in the test set
  - no game is detected → standardsettings

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References

- First
- Second
- ....