



NAO Challenge 2020

Team: DuoNao

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Planning as a tree search




- Iterative Deepening Search (with the AIMA library) in the **space of possible choreographies**
- Starting from a single-move choreography, we try to find a valid sequence of moves between two mandatory positions
- The solution must respect some constraints

Time constraint



- The entire choreography should respect a duration constraint of max. 180 seconds. Each partial solution must respect a time limit which depends both on the number of sub-choreographies and on the time required by mandatory positions
- The duration of each action has been measured separately and put into the code
- At the same time, a minimum of 5 moves must be performed in every sub-choreography

Position compatibility constraint



- The algorithm takes into account preconditions and postconditions of each move
- Two possible position-related states: sit down / stand up
- If a move has no preconditions, than it can be executed from both states

Repetitiveness of moves



- When testing a possible goal state, we evaluate the **entropy** (C. Shannon) of the entire sequence of moves done so far
- The goal is reached if a certain entropy minimum value is reached (this avoids, when possible, repetitiveness of moves)
- The minimum value is slightly increased at each execution of the algorithm

Acceptable moves



At each step, applicable moves are selected on the basis of 3 criteria:

1. is the remaining time enough to complete the move?
2. are the preconditions of the move respected in the current state?
3. is the move different from the one which was performed last?

The list of acceptable moves is **randomly shuffled** each time to avoid any bias. This leads to always different solutions!

Demo



Thank you

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