Authors:
Erick Rosete Beas — er165@uni-freiburg.de
Jessica Lizeth Borja Diaz — jb986@uni-freiburg.de

30.10.2019

Exercise 1.2 - State Space Size

The goal is to measure the time required to generate the whole state space if every state generation if generating one state take $1x10^{-6}s$.

Lets summarize the important data and variables:

- Five robotic vacuum cleaner.
- 10x10 discrete cells.
- Each robot is in exactly one cell and several robots can be in the same cell at the same time.
- Each cell is either clean or dirty.
- Each robot has a battery with 20 charge levels

The whole state space will be of the following size:

$$5^{100} * 20^5 * 2^{100} = 2^5 * 10^{105} = 32 * 10^{105}$$

Creating the whole state space will take

$$32 * 10^{105} * 10^{-6}s = 32 * 10^{99}s = 1.014 * 10^{93}years$$

Which is far bigger than the age of the universe.

Exercise 1.3 - Planning literature

The questions that we will like to discuss during the course of the lecture are the following:

1. How can we generate an heuristic function of a planning task?
2. During the article it was mentioned that the current model-based approaches like SAT may spend a lot of time solving problems with a big state space size. How does the recent development **SAT-based planning** overcomes this issue? Will this type of planner be included in the lecture?
3. Is there any other model-based approach besides SAT that combined with heuristic functions performs equal or better than SAT-based planning?

4. If not, why is SAT combined with heuristics instead of other model-based approaches?

5. Additionally from Torchlight, has there been any new advances on the field of automatically generating an optimal heuristic function?

6. Is LM-cut heuristic still the state of the art in planners? Will this topic be covered in the course?