

Get Me Out of Here: Determining Optimal Policies

Christian Pék

Technische Universität München

July 07, 2017

Motivation

- How to exit the labyrinth as fast as possible?



Figure: Labyrinth - The Game

Topic

- Dynamic Programming:
 - Given: grid map $M = \mathbb{Z}_2^{n \times m}$ containing static walls $M(i, j) = 1$ and exit(s) of the labyrinth, set of actions $\mathcal{A} = \{\leftarrow, \rightarrow, \uparrow, \downarrow\}$
 - Determine optimal policy $\mathcal{P} = \mathbb{Z}_2^{n \times m} \rightarrow \mathcal{A}$ to exit the labyrinth

Topic

- Dynamic Programming:
 - Given: grid map $M = \mathbb{Z}_2^{n \times m}$ containing static walls $M(i, j) = 1$ and exit(s) of the labyrinth, set of actions $\mathcal{A} = \{\leftarrow, \rightarrow, \uparrow, \downarrow\}$
 - Determine optimal policy $\mathcal{P} = \mathbb{Z}_2^{n \times m} \rightarrow \mathcal{A}$ to exit the labyrinth
- Your task:
 - Literature review on Dynamic Programming for robotic motion planning
 - Comparison to other path planning algorithms
 - Implement the Labyrinth scenario
 - Implement the dynamic programming algorithm

Topic

- Dynamic Programming:
 - Given: grid map $M = \mathbb{Z}_2^{n \times m}$ containing static walls $M(i, j) = 1$ and exit(s) of the labyrinth, set of actions $\mathcal{A} = \{\leftarrow, \rightarrow, \uparrow, \downarrow\}$
 - Determine optimal policy $\mathcal{P} = \mathbb{Z}_2^{n \times m} \rightarrow \mathcal{A}$ to exit the labyrinth
- Your task:
 - Literature review on Dynamic Programming for robotic motion planning
 - Comparison to other path planning algorithms
 - Implement the Labyrinth scenario
 - Implement the dynamic programming algorithm
 - Finally: Exit the labyrinth using the optimal policy!

Topic

- Dynamic Programming:
 - Given: grid map $M = \mathbb{Z}_2^{n \times m}$ containing static walls $M(i, j) = 1$ and exit(s) of the labyrinth, set of actions $\mathcal{A} = \{\leftarrow, \rightarrow, \uparrow, \downarrow\}$
 - Determine optimal policy $\mathcal{P} = \mathbb{Z}_2^{n \times m} \rightarrow \mathcal{A}$ to exit the labyrinth
- Your task:
 - Literature review on Dynamic Programming for robotic motion planning
 - Comparison to other path planning algorithms
 - Implement the Labyrinth scenario
 - Implement the dynamic programming algorithm
 - Finally: Exit the labyrinth using the optimal policy!

⇒ Any questions? Interested? Feel free to contact me!
christian.pek@tum.de