A Graph-Based Search Approach to Planning and Learning

G.S Groote
Supervisors:
(daily)
C. Pezzato
M. Wisse
C. Smith

Delft University of Technology, The Netherlands

April 20, 2023

Thesis Goal

- Learning System Models
- Navigation Among Movable Objects
- Nonprehensile Pushing

Joint Configuration Space

make slide

Research Question

make slide

State-of-The-Art

Groote	proposed solution	✗/✓	✓	✓	pushing

Table: Overview of 3 topics in recent literature and their object manipulation, where *grasp-push* and *grasp-pull* refer to prehensile push and pull manipulation, *gripped* refers to fully gripping and lifting objects for manipulation, *pushing* refers to nonprehensile push manipulation. The proposed method shows ✗/✓for learning system dynamics because it proposes system identification to generate a system model, however for the implementation an hardcoded system model is used.

Robot Environment

make slide

Assumptions

make slide

Task Specification

make slide

Required Background: Path Estimation

Proposed method slide

Required Background: Planning

Proposed method slide

Required Background: System identification

Proposed method slide

Required Background: Control Methods

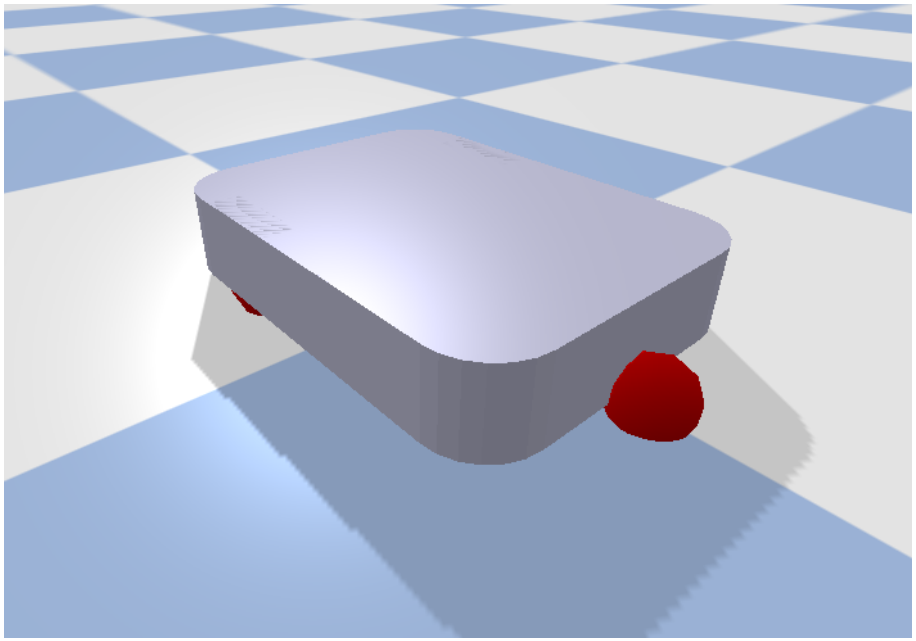
Proposed method slide

Required Background: Summary

Proposed method slide

Proposed Method an Overview

Proposed method slide



Hypothesis Algorithm

Proposed method slide

Example frame 1

resuts slide

Example frame 2

Block

- item 1
- item 2

Example

1. Sugar in a stirred cup of tea gathers in the middle.
2. Rivers often take a detour through flat terrain.

Alert

Rivers and sweet tea do unexpected things.[1]

[1] *Unimate// the First Industrial Robot* (June 4, 2022). URL: https://www.automate.org/a3-content/joseph-engelberger-unimate

Mass–energy equivalence

They say every formula you add to a presentation, will reduce your audience by 50 %. A simple yet effective way to mitigate this effect, is adding a compact nomenclature to the slides containing formulae.

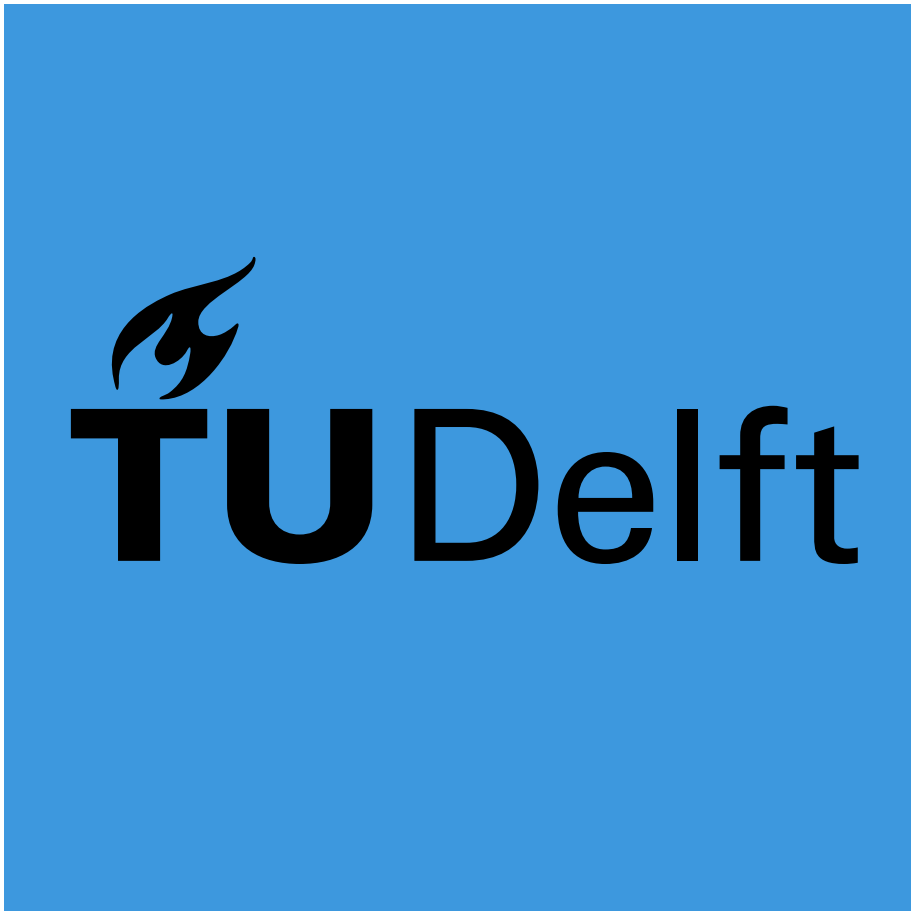
$$E = mc^2$$

If you find this is taking up too much of your precious space, than you are doing something wrong, and it is not adding this little nomenclature. The optional argument specifies the number of column pairs.

E Energy (J)
c Speed of light in vacuum (m/s)
m Mass (kg)

columns

first column



animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...

Using only:1
Using onslide:1
Using pause:

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...

Using only:2
Using onslide: 2
Using pause:

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...
3. by...

Using only:3

Using onslide: 3

Using pause:

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...
3. by...
4. one.

Using only:
Using onslide:
Using pause:

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...
3. by...
4. one.

Using only:
Using onslide:
Using pause:

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...
3. by...
4. one.

Using only:
Using onslide:
Using pause:1

animation

Some commands take optional arguments in the form of <x-y>, where x is the first 'sub-frame' on which the context is shown, and y is the last. x or y can be replaced by +, referring to 'the next sub-frame'.

1. uncovered...
2. one...
3. by...
4. one.

Using only:
Using onslide:
Using pause:12

animation

Some commands take optional arguments in the form of `<x-y>`, where `x` is the first 'sub-frame' on which the context is shown, and `y` is the last. `x` or `y` can be replaced by +, referring to 'the next sub-frame'.

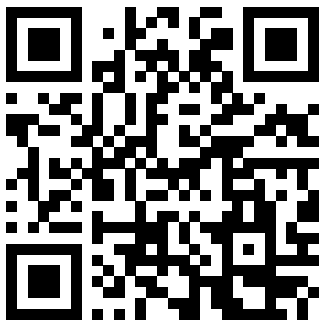
1. uncovered...
2. one...
3. by...
4. one.

Using only:
Using onslide:
Using pause:123

For more advanced animations, see §14 of the manual:
`https://www.ctan.org/pkg/beamer`

Thanks for your attention.
A digital version of this presentation can be found here:

`https://gitlab.com/novanext/tudelft-beamer`



Bibliography I

Unimate// the First Industrial Robot (June 4, 2022). URL: https://www.automate.org/a3-content/joseph-engelberger-unimate.