FACULTY OF ENGINEERING AND ARCHITECTURE

ARTIFICIAL INTELLIGENCE (E016330)
PROFESSOR: ALEKSANDRA PIŽURICA
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PATH FINDING WITH A*

Shaoguang Huang, Srđan Lazendić, Xian Li, Laurens Meeus, Nina Žižakić
professor: Aleksandra Pižurica

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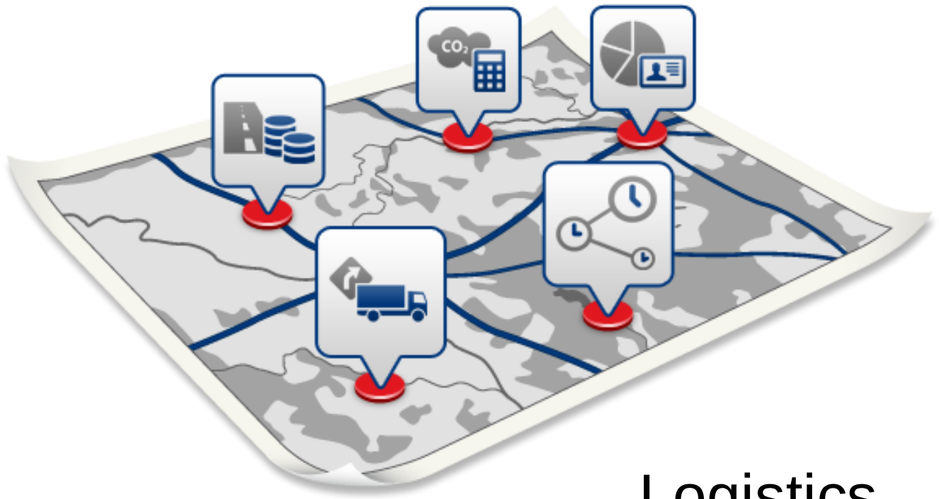
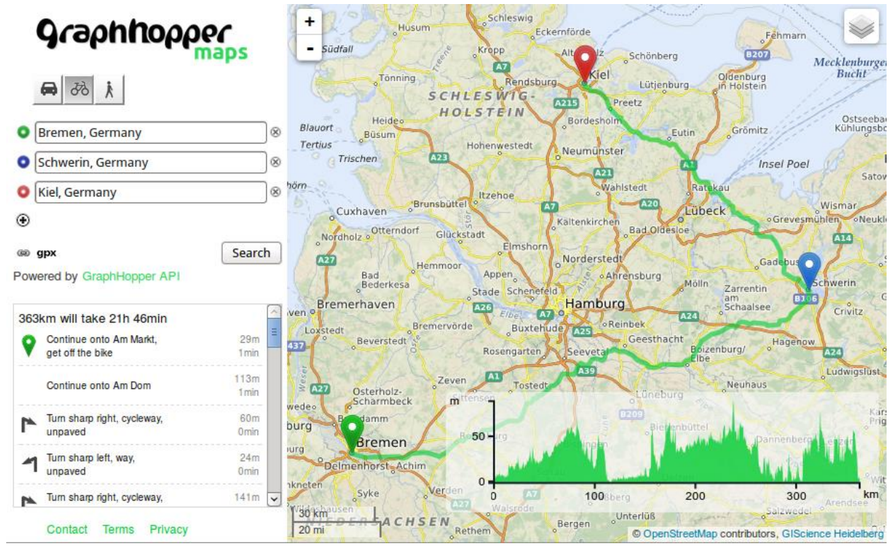
INTRODUCTION

Path finding:

- Applications:



Logistics



GPS

Gaming

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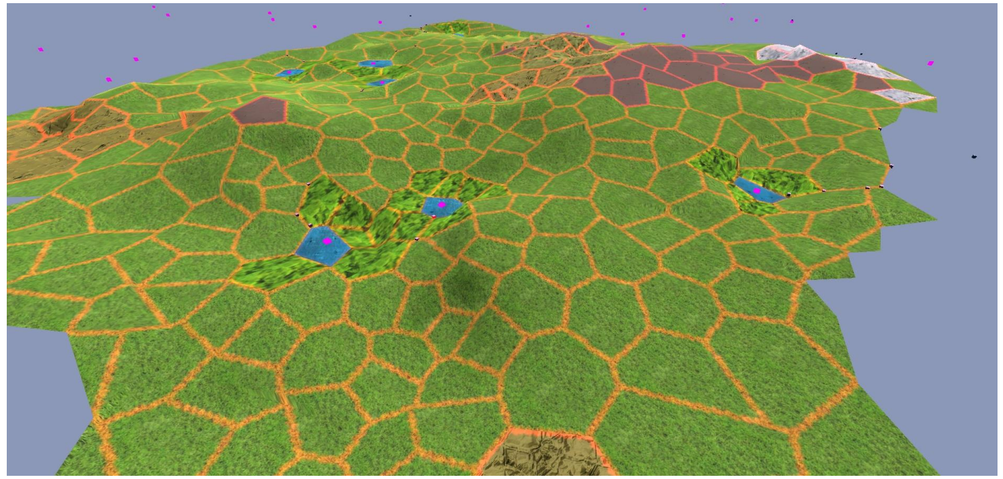
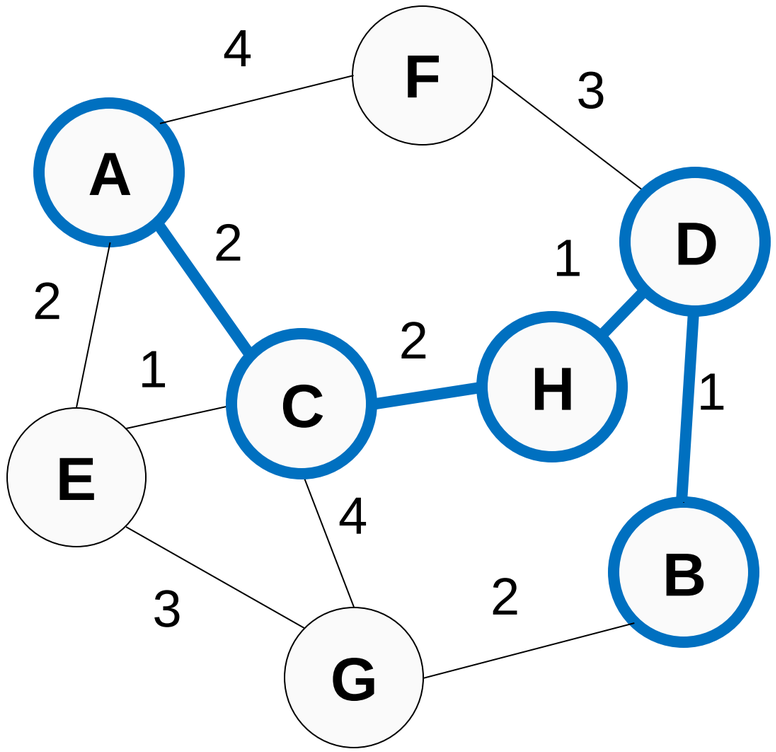
INTRODUCTION



Path finding:

- Problem domains transformed to graphs
- How to get from A to B as efficiently as possible
- "efficiently" -- path with the smallest edge cost



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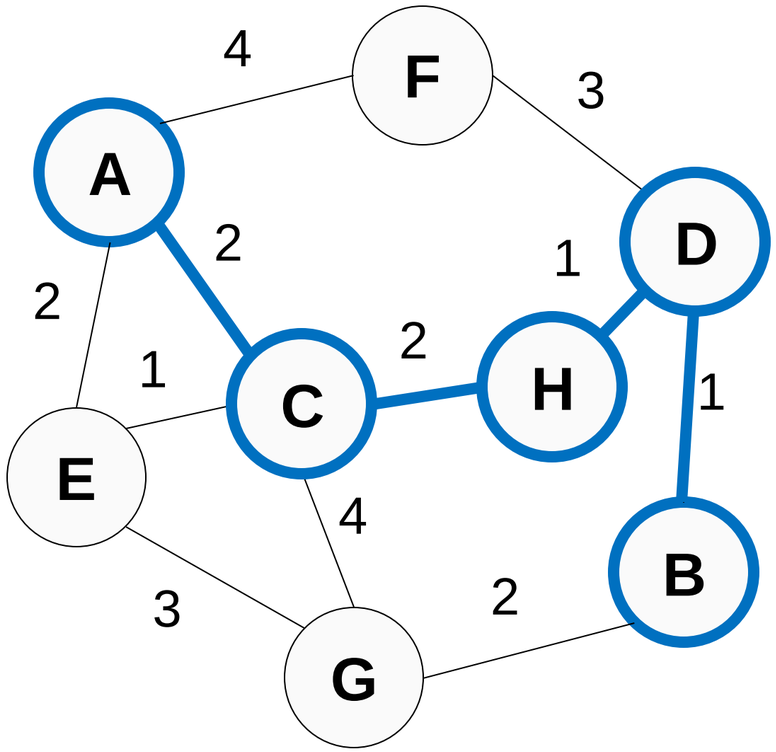
A* ALGORITHM

- For path finding and graph traversal
  - Finding least-cost path between start and goal node

- Informed search algorithm => uses heuristics



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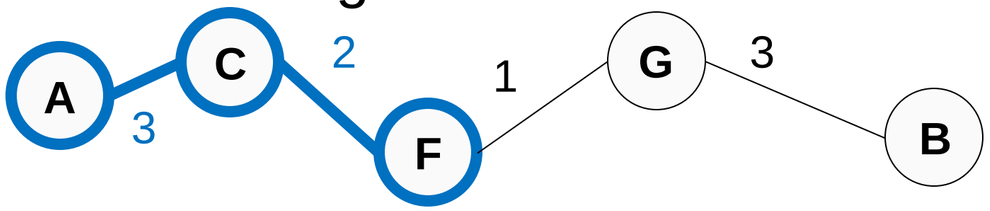
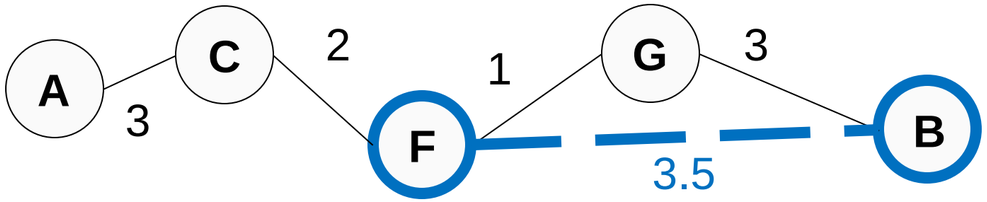
A* ALGORITHM

Path finding with the A* algorithm:

- $g(n)$: current least cost to get from node A to n



- $h(n)$: heuristic cost to get from node n to B (e.g. Euclidean distance)



- Current cheapest path through n:

$$f(n) = g(n) + h(n)$$

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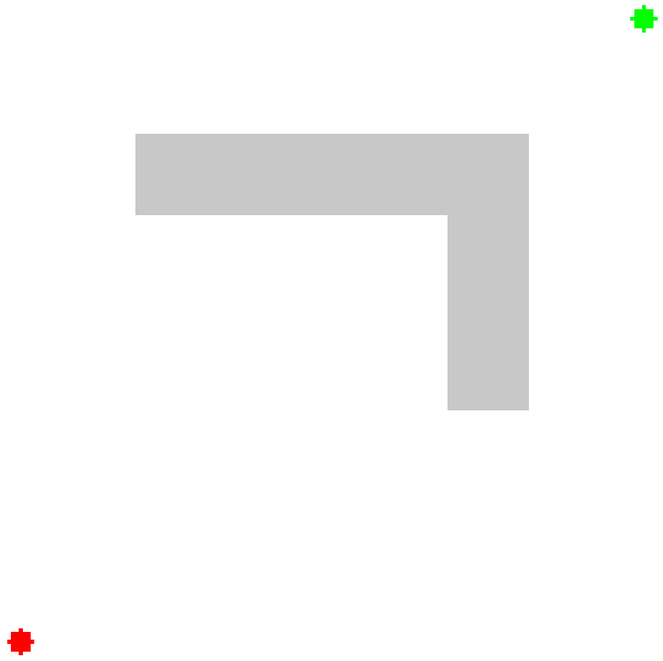
A* ALGORITHM

Path finding with A*:

- Expand non-visited neighbors of node with lowest f-value and check for potential cheaper paths along these neighbors



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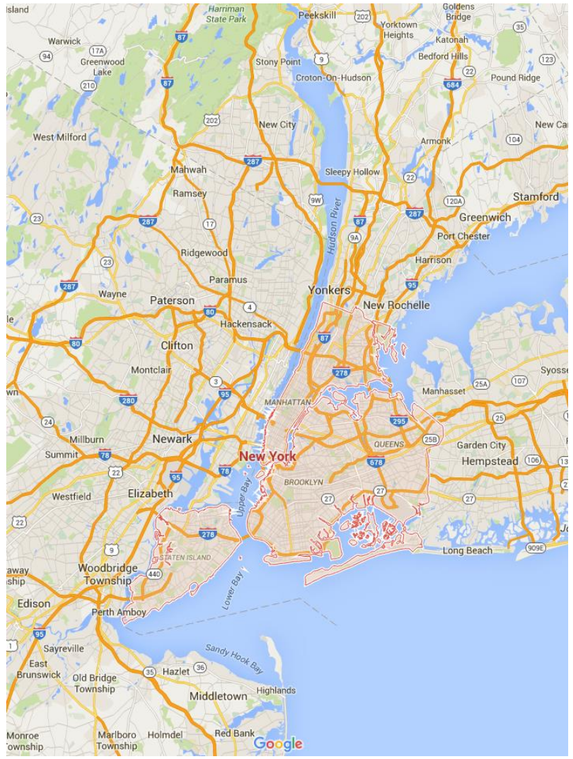
ASSIGNMENT

Assignment:

- Implement A* in Python
- Shortest path w.r.t. minimal distance / time in a NY street map
- Alternative heuristics



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PROGRAMMING IN PYTHON

Need to refresh your Python skills?

- Ufora: Content/B. Practicals/Practicals 0/Python_Basics.ipynb
- or https://developers.google.com/edu/python/

Use Google Colab to upload and run your code

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GETTING STARTED

- Assignment on Ufora: Content/B. Practicals/Practical 1
- Edit a_star.ipynb
- Downloading the NY traffic data

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ASSIGNMENT

Assignment:

- Ufora: Content/B. Practicals/Practical 1

- In groups of 2
  - Choose groups on Ufora

- Send questions to
  - ai@lists.ugent.be

- Deadline
  - November 1st, 2019 (23:59)

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