Homework 2 - Route Finding

Due Date: 4/8 (Mon.) 23:59

Introduction

Building **a Navigation system** involves three steps, mapping, localization, and route finding.

In this homework, we will focus on the third part - route finding. Assuming that you have all information about the map, try to use different **route finding algorithms** to find a path from the start point to the target.

Implementation (70%)

- Part 1: Breadth-first Search (10%)
- Part 2: Depth-first Search (10%)
- Part 3: Uniform Cost Search (20%)
- Part 4: A* Search (20%)
- Part 5: Test your implementation (10%)
- Part 6: Search with a different heuristic (Bonus) (10%)

```python
def bfs(start, end):
    # Begin your code (Part 1)
    raise NotImplementedError("To be implemented")
    # End your code (Part 1)
```

```python
def dfs(start, end):
    # Begin your code (Part 2)
    raise NotImplementedError("To be implemented")
    # End your code (Part 2)
```

Only the standard Python library is allowed in this assignment

Map Information

Node index | end node 1 | end node 2 | end node 3

	node	1079387396	1737223506	8513026827
0	26059311	2542.932898	4595.546500	8461.891002
1	26059312	2876.569174	4668.293059	8748.606356
2	26059315	3112.285752	4786.599119	8911.062591
3	26059321	3278.774400	4765.657907	9113.111144
4	26059325	3451.720839	4864.308653	9234.820445
...	...	...	...	...
12333	8513026827	7001.692799	11127.147601	0.000000
12334	8513026828	7010.078558	11136.582324	12.673841
12335	8513026829	6875.846934	10999.746349	127.526785
12336	8513027209	769.325922	3531.459884	7770.960382
12337	8540463858	5049.826067	858.849949	11966.173503

heuristic.csv

	start	end	distance	speed limit
0	26059311	3256115046	53.141	50.0
1	26059311	4429332928	11.548	46.4
2	26059311	4419128653	14.588	50.0
3	26059312	3256115020	33.469	50.0
4	26059312	420547128	52.411	50.0
...	...	...	...	...
23649	8513026829	1072288414	43.595	59.3
23650	8513026829	7537285727	32.068	59.3
23651	8513027209	2399106487	58.160	46.4
23652	8513027209	2399106471	4.288	46.4
23653	8540463858	4413408590	42.700	59.3

edges.csv

Example Results

HW2_Example_Results .DOCX

檔案 編輯 查看 插入 格式 工具 說明

Test 1 :
from National Yang Ming Chiao Tung University (ID: 2270143902)
to Big City Shopping Mall (ID: 1079387396)

BFS:

```
The number of nodes in the path found by BFS: 88
Total distance of path found by BFS: 4978.8820000000005 m
The number of visited nodes in BFS: 4273
```

Report (30%)

Follow the instructions in **spec** and **report template**

- The report should be written in **English**.
- Please save the report as a **“report.pdf”**.
- For part 1 ~ 4, please take a screenshot of your code and explain your implementation in detail.
- For part 5, please take a screenshot of the results and discuss it.
- For part 6 (bonus), please take a screenshot of your code and explain your implementation in detail. And take a screenshot of the results and discuss it.
- Describe problems you encounter and how you solve them.
- Answer the questions in the report template.

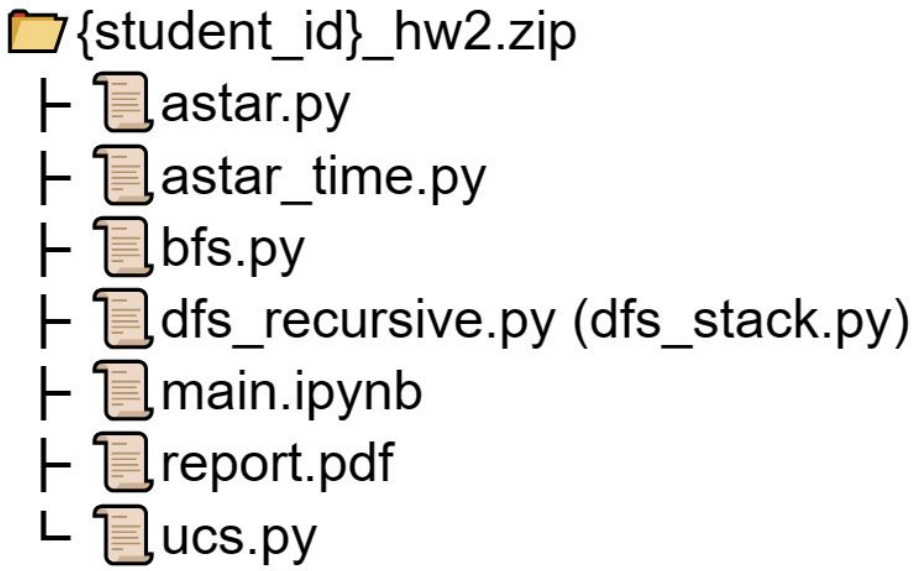
Submission

Due Date: 4/8 (Mon.) 23:59

Please directory compress all your code files and report (.pdf) into {STUDENT ID}_hw2.zip (ex. 109123456_hw2.zip) and **submit it to the New E3 System.**

Wrong submission format leads to -10 point

Late submission leads to -20 points per day



QA Page

If you have any questions about this homework, please ask them on the following Notion page. We will answer them as soon as possible. Additionally, we encourage you to answer other students' questions if you have any idea😄

https://lopsided-soursop-bec.notion.site/HW2-QA-Sheet-9a731b94bd98480d83ba4c7bbe170555?pvs=4

Please check out the spec for more details!