Zadání 1. úkolu do předmětu IZU

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Pomocí metody A* najděte nejkratší cestu v mapě složené z pravidelných buněk, kde cena přechodu mezi dvěma stavy (buňkami) je dána číslem, uvedeným v Tabulce 1 (a je stejná pro všechny přechody ze sousedních míst do příslušné buňky). Nepřekročitelné buňky mají hodnotu "Z" (jako "zeď"). Po každém kroku vypište nové hodnoty seznamů Open a Closed. Do pomocné tabulky s ohodnocením uzlů zapisujte aktuálně zkoumaný uzel, cenu cesty do aktuálního uzlu „g", heuristiku „h" a celkovou cenu cesty „f". Heuristiku počítejte jako přímou vzdálenost středů dvou buněk, kde velikost strany jedné buňky je rovna jedné. Uzly generujte v pořadí zleva doprava a shora dolů, uvažujte 8-okolí buňky (tzn. operátory $\nwarrow, \uparrow, \nearrow, \leftarrow, \rightarrow, \swarrow, \downarrow, \searrow$). Výslednou cestu zapište do tabulky Výsledná cesta. Uzel se skládá ze souřadnic, z ohodnocení f a souřadnic uzlu, ze kterého byl vygenerován nebo z operátoru, který byl použit (aby bylo možné nalézt cestu od startu k cíli).

Uzly zapisujte: ([sloupec, řádek], celkové ohodnocení f, [souřadnice otcovského uzlu nebo operátor])

Start: ([2, 4], 5.0, [null])
Cíl: ([6, 7], X, [?, ?])

Výsledná cesta:

[2, 4]	[3, 5]	[4, 6]	[5, 5]	[6, 6]
[6, 7]				

y/x	0	1	2	3	4	5	6	7	8	9
0	8	8	8	8	Z	9	7	7	8	9
1	8	8	6	7	Z	9	9	9	9	9
2	9	9	9	9	Z	9	9	9	9	9
3	9	Z	Z	Z	Z	Z	Z	Z	9	7
4	9	Z	2	6	Z	8	9	9	9	6
5	9	Z	5	4	Z	3	3	3	3	3
6	3	3	3	3	3	9	4	7	9	7
7	9	9	8	8	Z	9	2	8	8	9
8	6	6	5	7	Z	Z	Z	Z	7	8
9	7	7	7	5	Z	8	7	8	7	9

Tabulka 1: Mapa přechodů. Např. cena přechodu do cílové buňky je rovna 2 pro všechny buňky s cílovou buňkou sousedící.

Pomocná tabulka:

	Uzel	g	h	f		Uzel	g	h	f
01.	[2, 4]	0	5.0	5.0	16.	[6, 4]	19	3	22
02.	[3, 4]	6	4.24	10.24	17.	[6, 5]	13	2	15
03.	[2, 5]	5	4.47	9.47	18.	[6, 6]	14	1	15
04.	[3, 5]	4	3.61	7.61	19.	[0, 5]	17	6.32	23.32
05.	[2, 6]	7	4.12	11.12	20.	[0, 6]	11	6.08	17.08
06.	[3, 6]	7	3.16	10.16	21.	[0, 7]	17	6	23
07.	[4, 6]	7	2.24	9.24	22.	[7, 5]	16	2.24	18.24
08.	[5, 5]	10	2.24	12.24	23.	[7, 6]	20	1.41	21.41
09.	[5, 6]	16	1.41	17.41	24.	[6, 7]	16	0	16
10.	[3, 7]	15	3	18	25.	[7, 7]	22	1	23
11.	[5, 7]	16	1	17	26.	[7, 4]	22	3.16	25.16
12.	[1, 6]	8	5.1	13.1	27.	[7, 5]	16	2.24	18.24
13.	[2, 7]	15	4	19	28.	[7, 6]	20	1.41	21.41
14.	[1, 7]	16	5	21	29.				
15.	[5, 4]	18	3.16	21.16	30.				

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1. iterace

Open:

[2, 4], 5.0, NULL				

Closed:

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2. iterace

Open:

[3, 4], 10.24, [2, 4]	[2, 5], 9.47, [2, 4]	[3, 5], 7.61, [2, 4]		

Closed:

[2, 4], 5.00, NULL				

3. iterace

Open:

[3, 4], 10.24, [2, 4]	[2, 5], 9.47, [2, 4]	[2, 6], 11.12, [3, 5]	[3, 6], 10.16, [3, 5]	[4, 6], 9.24, [3, 5]

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]			

4. iterace

Open:

[3, 4], 10.24, [2, 4]	[2, 5], 9.47, [2, 4]	[2, 6], 11.12, [3, 5]	[3, 6], 10.16, [3, 5]	[5, 5], 12.24, [4, 6]
[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]		

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]		

5. iterace

Open:

[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[3, 6], 10.16, [3, 5]	[5, 5], 12.24, [4, 6]	[5, 6], 17.41, [4, 6]
[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]		

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	

6. iterace

Open:

[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]
[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]	[2, 7], 19.00, [3, 6]		

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]

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7. iterace

Open:

[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]
[1, 6], 13.10, [2, 5]	[2, 7], 19.00, [3, 6]			

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]				

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8. iterace

Open:

[5, 5], 12.24, [4, 6]	[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]
[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]			

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]			

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9. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]	[2, 7], 19.00, [3, 6]
[1, 7], 21.00, [2, 6]	[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[6, 6], 15.00, [5, 5]

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]		

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10. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]
[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[6, 6], 15.00, [5, 5]	[0, 5], 23.32, [1, 6]
[0, 6], 17.08, [1, 6]	[0, 7], 23.00, [1, 6]			

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[1, 6], 13.10, [2, 5]	

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11. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]
[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[0, 5], 23.32, [1, 6]	[0, 6], 17.08, [1, 6]
[0, 7], 23.00, [1, 6]	[7, 5], 19.24, [6, 6]	[7, 6], 22.41, [6, 6]	[6, 7], 16.00, [6, 6]	[7, 7], 23.00, [6, 6]

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[1, 6], 13.10, [2, 5]	[6, 6], 15.00, [5, 5]

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12. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]
[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[0, 5], 23.32, [1, 6]	[0, 6], 17.08, [1, 6]	[0, 7], 23.00, [1, 6]
[7, 5], 18.24, [6, 5]	[7, 6], 21.41, [6, 5]	[6, 7], 16.00, [6, 6]	[7, 7], 23.00, [6, 6]	[7, 4], 25.16, [6, 5]

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[5, 5], 12.24, [4, 6]	[6, 6], 15.00, [5, 5]
[6, 5], 15.00, [5, 5]				

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13. iterace

Open:

Closed:

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14. iterace

Open:

Closed:

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15. iterace

Open:

Closed:

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16. iterace

Open:

Closed:
