Robotiks WS17/18

Assignment 12

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Repo: https://github.com/al-eax/robotik_ws1718

A* Tree

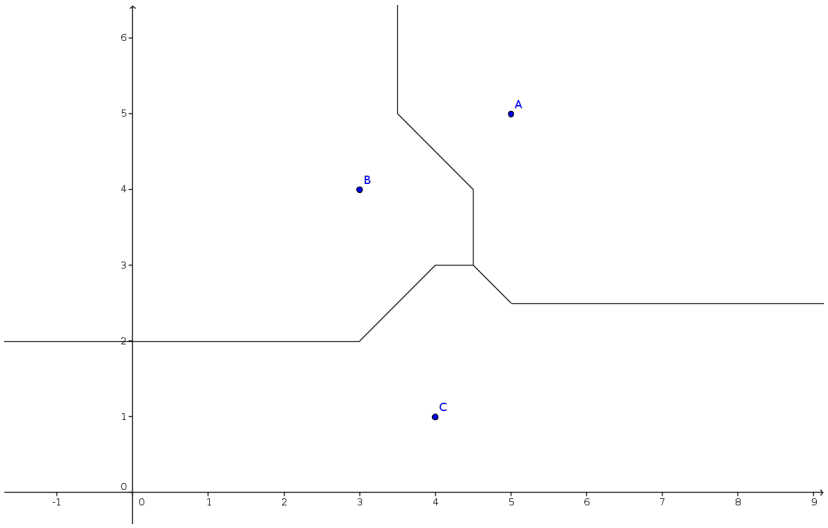
Step	Opend {g+h}	Closed
0	**H{0+19}**	
1	**G(10+1)**, E{10+20}, D{10+35}, C{10+42},	H{0+19}
2	**E{10+20}**, F{20+18}, D{10+35}, C{10+42}	H{0+19}, G{10+1},
3	**F{20+18}**, D{10+35}, C{10+42}	H{0+19}, G{10+1}, E{10+20}
4	**B{30+9}**, D{10+35}, C{10+42}	H{0+19}, G{10+1}, E{10+20}, F{20+18},
5	**A{40+0}**, D{10+35}, C{10+42}	H{0+19}, G{10+1}, E{10+20}, F{20+18}, B{30+9}

Shortest way under consideration of alphanumerical values: $h \to g \to e \to f \to b \to a$.
This heuristic is **not** optimistic. Some heuristics are higher than the actual path costs. Have a look at C to A. This means, the graph is not consistent.

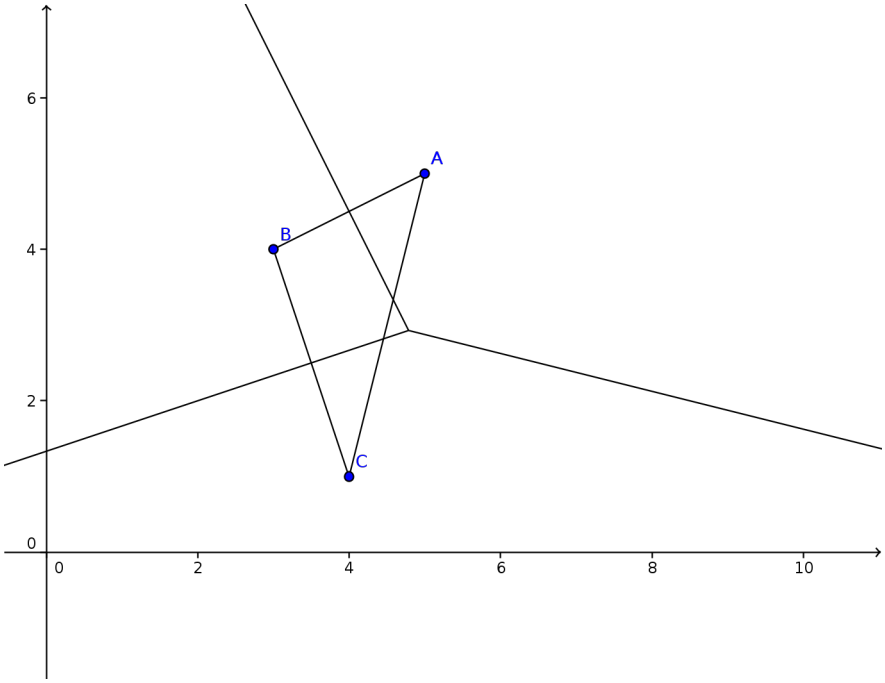
A non consistent graph doesnt find the optimal path, as you can see.

2. Voronoi-Diagrams

l1 metric



l2 metric



3. Potential Fields

$$F_G = d_G^2 = \left(\sqrt{(x-3)^2 + (x-4)^2}\right)^2 = (x-3)^2 + (y-4)^2$$

$F_O = \frac{3}{d_O^2} = \frac{3}{(x-2)^2+(y-3)^2}$

derivation of F_G

$F'_{xG}(x,y) = 2x - 6$

$F'_{yG}(x,y) = 2y - 8$

derivation of F_O

$u = 3; u' = 0$

$v = (x-2)^2 + (y-3)^2$

$v'_x = 2x - 4; v'_y = 2y - 6$

$F'_{xO}(x,y) = \frac{-3*(2x-4)}{((x-2)^2+(y-3)^2)^2}$

$F'_{yO}(x,y) = \frac{-3*(2y-6)}{((x-2)^2+(y-3)^2)^2}$

force vectors

$\vec{F_O} = (F'_{xO}(1,1), F'_{yO}(1,1))^T = (\frac{6}{25}, \frac{6}{25})^T$

$\vec{F_G} = (F'_{xG}(1,1), F'_{yG}(1,1))^T = (-4, -6)^T$